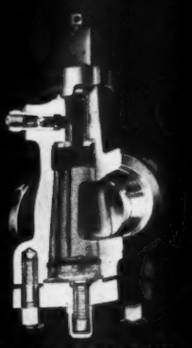

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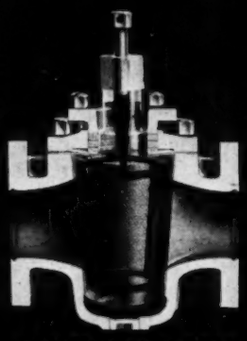

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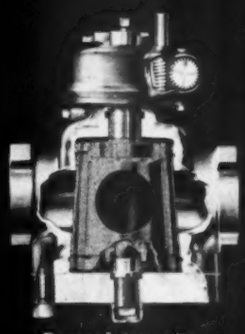

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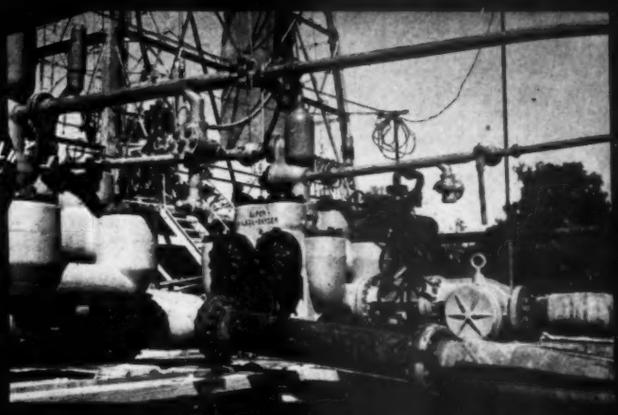

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Western Petroleum Refiners Association, Annual Meeting—April 25, 26, and 27, Hot Springs, Arkansas.

•

California Natural Gasoline Association—May 5, Richfield Building, Los Angeles, California.

•

American Gas Association, Natural Gas Department, Annual Meeting—May 9, 10, 11, and 12, New Orleans, Louisiana.

•

Natural Gasoline Association of America, Annual Convention—May 11, 12, and 13, Hotel Tulsa, Tulsa, Oklahoma.

•

International Petroleum Exposition—May 14, 15, 16, 17, 18, 19, 20, and 21, Tulsa, Oklahoma.

•

American Petroleum Institute, Eighth Mid-Year Meeting — May 23, 24, and 25, Wichita, Kansas.

•

Pennsylvania Grade Crude Oil Association and Pennsylvania Natural Gas Men's Association, Seventh Annual Petroleum and Natural Gas Conference—May 27 and 28, Pennsylvania State College, State College, Pennsylvania.

•

Society of Automotive Engineers, Summer Meeting—June 12, 13, 14, 15, 16, and 17, White Sulphur Springs, West Virginia.

•

American Society of Mechanical Engineers, National Oil and Gas Power Meeting—June 15, 16, 17, and 18, Dallas, Texas.

•

Pennsylvania Grade Crude Oil Association — June 16, 17, and 18, Pittsburgh, Pennsylvania.

•

American Society of Mechanical Engineers—June 20, 21, 22, 23, and 24, St. Louis, Missouri.

•

American Society for Testing Materials. Annual Meeting—June 27, 28, 29, 30, and July 1, Atlantic City, New Jersey.

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Seventh Floor Allen Building DALLAS, TEXAS Telephone: 2-4571

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The Course of Oil

By K. C. SCLATER

Water Production Losses Unless checked, water withdrawal from the East Texas pool will lower the reservoir pressure a greater amount during the next two years than will the withdrawal of oil alone during the entire remaining life of the field. This is the observation made in a revealing picture of changing reservoir conditions in the East Texas field, presented in a paper read at the A.P.I. Spring Meeting of the Southwestern District, Division of Production. The production of water is accelerating the decline of reservoir pressure at an alarming rate. Should the present trend in the rate of water withdrawal be allowed to continue, the indications are that early 1940 will witness the end of the flowing life of the field.

Though the economy of maintaining a high reservoir pressure is generally recognized, the losses that result from the dissipation of reservoir pressure are not so well known. Fortunately, cold facts and figures from reliable experience data are available for the East Texas field; from these, the losses that will result from unrestricted water production have been determined.

Up to January 1, 1937, water withdrawal accounted for a decline of 15 pounds in reservoir pressure. By January 1, 1938, the decline in reservoir pressure resulting from water withdrawal was 40 pounds. During 1937 the total decline in reservoir pressure for the pool was 49 pounds, 24 of which resulted from oil withdrawal; the other 25 pounds decline was due to water withdrawal. By January 1, 1939, the reservoir pressure will have declined to 1030 pounds and by January 1, 1940, to 870 pounds. Should the present trend in the rate of water production continue the entire benefits of restricted rate of production in the East Texas field, it is stated, may be obliterated during the next two years.

Were no water to be produced with the oil from now on it is estimated that by January, 1946, at least two and one-half billion barrels of oil would be produced by natural flow, but if the present trend in rate of water production is allowed to continue, natural flow will cease by 1940 and only about one and a half billion barrels of oil will have been produced by natural flow. In other words, more than a billion barrels of oil would have to be produced by pumping or other mechanical lifting means that might have been produced by natural flow.

There would also be other adverse economic consequences. The ultimate production would be reduced by 20 percent or more of the present remaining recoverable oil in the pool. This may amount to 300 billions or more barrels of oil, a loss equivalent to the total production of several fields of normal size. There is also the cost of disposing of the water produced. This item is a large one, which alone should be a deterrent to producing water.

Three Remedial Possibilities The water problem in the East Texas field, it is noted, has been receiving the serious attention of the Railroad Commission for months, according to Commissioner Thompson. He mentions three possibilities leading to a solution of the problem.

One is the proration of fluid production rather than of oil production. Under this plan of proration wells producing with a large water/oil ratio would be penalized. Many would be forced to shut down. It would have the salutary effect of forcing operators to exert every effort to shut-off water in their wells.

The second possibility is to return to the sand, through selected key wells, the water produced with the oil and so retard the decline of reservoir pressure. It is not known whether this would be practicable. Experiments now being made may determine the feasibility of maintaining reservoir pressure by water injection.

The third possibility is that of reducing the water withdrawal from the reservoir by the general application of squeeze-cementing methods for shutting-off water in wells. This would appear to be a constructive course to follow. Not only would it effect a substantial reduction in water production if successful, but it would also be an economical means of maintaining the reservoir pressure. The cost of lifting the water with the oil and returning it to the sand under pressure would be eliminated, or at least substantially reduced.

It is true that efforts are being made to reduce the water production in many wells in the field, but unless regulations for restricting water production in all wells are issued soon, operators will be faced with increased lifting costs and the field suffer a substantial loss in ultimate recovery. The magnitude of these losses is great enough that action on this problem should be hastened at all costs.

Three Miles Deep A well in California has recently been drilled to a depth of almost three miles —the world's deepest drilling record. Although the well will not produce at this depth it is likely to yield commercial production from a depth of 13,000 to 14,000 feet — also the deepest production on record. It is quite probable that within the next few years many wells of depths greater than 15,000 feet will be completed, but the problem of completing such wells may not be so difficult as that of producing them economically. This is a problem the solution of which may involve the development of new production methods, or at least a modification of present production practices.

« « HIGHLIGHTS IN OILDOM » »

Crude Exports Reach New High in 1937

An all-time record for crude petroleum exports was established in 1937 with the shipping abroad by the United States of 67,179,000 barrels. This is according to the United States Department of Commerce.

Exports of crude showed an increase over 1936 of 33.5 percent and surpassed 1929 by 154.5 percent. In view of the progressive upswing in exports it is of interest to compare for different years the ratio of shipments abroad to crude production in the United States, the report of the Department of Commerce states.

Domestic crude production in 1937 of 1,277,633,000 bbl. represents an increase of 16.2 percent over 1936, and an increase of 26.8 percent over 1929. Although most of this increase was needed to supply the increased consumption of refined products in the United States, that needed for export has shown a steady advance with respect to the proportion of foreign shipments as compared with domestic production. In 1929 the ratio was 2.6 percent; in 1936, 4.6 percent; and in 1937, 5.3 percent.

Shipments of refined mineral oils abroad increased from 71,522,000 bbl. in 1936 to 94,582,000 bbl. in 1937, a gain of 32 percent. They were less than in 1929, however, when 126,195,000 bbl. were exported. Exports of refined oils in 1937 comprised 8 percent of the total domestic production as against 6.7 percent for 1936, but short of the 12.4 percent of 1929.

Canada, France, and Japan continue as the principal buyers of American crude petroleum.

●

Vacuum-Lift Permissible, Oklahoma Court Holds

The Supreme Court of Oklahoma has ruled that the State Corporation Commission can prohibit the use of vacuum-lift for the recovery of oil only when it can be proved that that method creates waste. By its ruling the Supreme Court vacated an order prohibiting the use of vacuum-lift in the Healdton field of Carter County. It was handed down in an appeal by the Gilmer Oil Company and Roy M. Johnston, operators in the field.

The opinion declared that no positive evidence was introduced to show that the use of vacuum-lift had damaged producing sands in the field or dissipated gas reservoir pressure. Some witnesses testified the method was improper but the court held that this theory was "unsupported by established facts."

"It has been shown that the vacuum-lift method has been employed in other fields over a period of 60 years with successful results from every known point of view," the court stated further.

●

Oil Defendants File Amended Appeals

Counsel for Henry M. Dawes, president of the Pure Oil Company, and Edward G. Seubert, president of the Standard Oil Company of Indiana, have filed amended motions of appeal to show the officials were not connected with any gasoline price-fixing conspiracy. Charles Francis, counsel, offered Federal Judge Patrick T. Stone a copy of the minutes of the planning and coördination committee of the NRA petroleum code as evidence that Dawes and Seubert did not attend the first committee meetings January 8 and 9, 1935, although they had been appointed members of the committee.

The government, which obtained conviction of 16 major companies and 30 individuals for violation of the Sherman anti-trust act, claimed major companies, early in 1935, agreed upon an illegal program of purchasing surplus gasoline from independent refiners and were able to fix gasoline prices in the midwest.

John Henry Lewin, attorney for the government, objected to introduction of the committee minutes as a part of the record, but Judge Stone held that the minutes could be made a part of an amended motion for a new trial for the two officials inasmuch as they were convicted on circumstantial evidence.

●

Texas' Seizure Law Held Valid By Court

The constitutionality of Texas' hot oil confiscation law was upheld by a recent decision of the Third Court of Civil Appeals. This decision affirmed a ruling by a lower court that permitted the state to confiscate 10,000 bbl. of oil produced in violation of conservation laws. Appeal from the lower court's ruling was by the Skipper Bivens Oil Company.

The appellant contended that the oil being in steel storage and a useful article of commerce and not inherently vicious was not in fact a nuisance and could not be made so by legislative fiat; and that inasmuch as the oil was produced prior to the effective date, May 11, 1935, the act was retroactive and void as to it.

Chief Justice James W. McClendon said in giving the court's decision:

"Probably no legal principle is more firmly grounded in our jurisprudence than that the State has power to conserve the natural resources within its boundaries, and to enact such laws, and through properly constituted legislative agencies promulgate such regulations thereunder as may be necessary or appropriate to effectuate that objective."

The court concluded that the law was not unconstitutional as being retroactive with respect to already existing illegal oil but "merely afforded a remedy for the abatement of an existent nuisance."

●

Cut Production Venezuelan Crude Oil

Venezuela's production of crude oil was further curtailed in February, total output being approximately ten percent less than in January. Compared with February of last year, however, production this year showed an increase because Venezuela in the early part of 1937 was suffering from a strike in the oil fields.

All but two companies had reduced production in February compared with January, namely, the Mene-Grande-Gulf, which increased its output by 172,000 bbl., and British Controlled Oilfields, which had an increase of 5000 barrels.

●

New Gas-Oil Ratio for Rodessa

The Texas Railroad Commission has reduced from 5000 to 3500 cu. ft. per bbl. the gas/oil ratio permitted in the Dees-Young horizon of the Rodessa field. As a result of this order, Rodessa Field Rule 10 provides that any well having a ratio in excess of 3500 cu.

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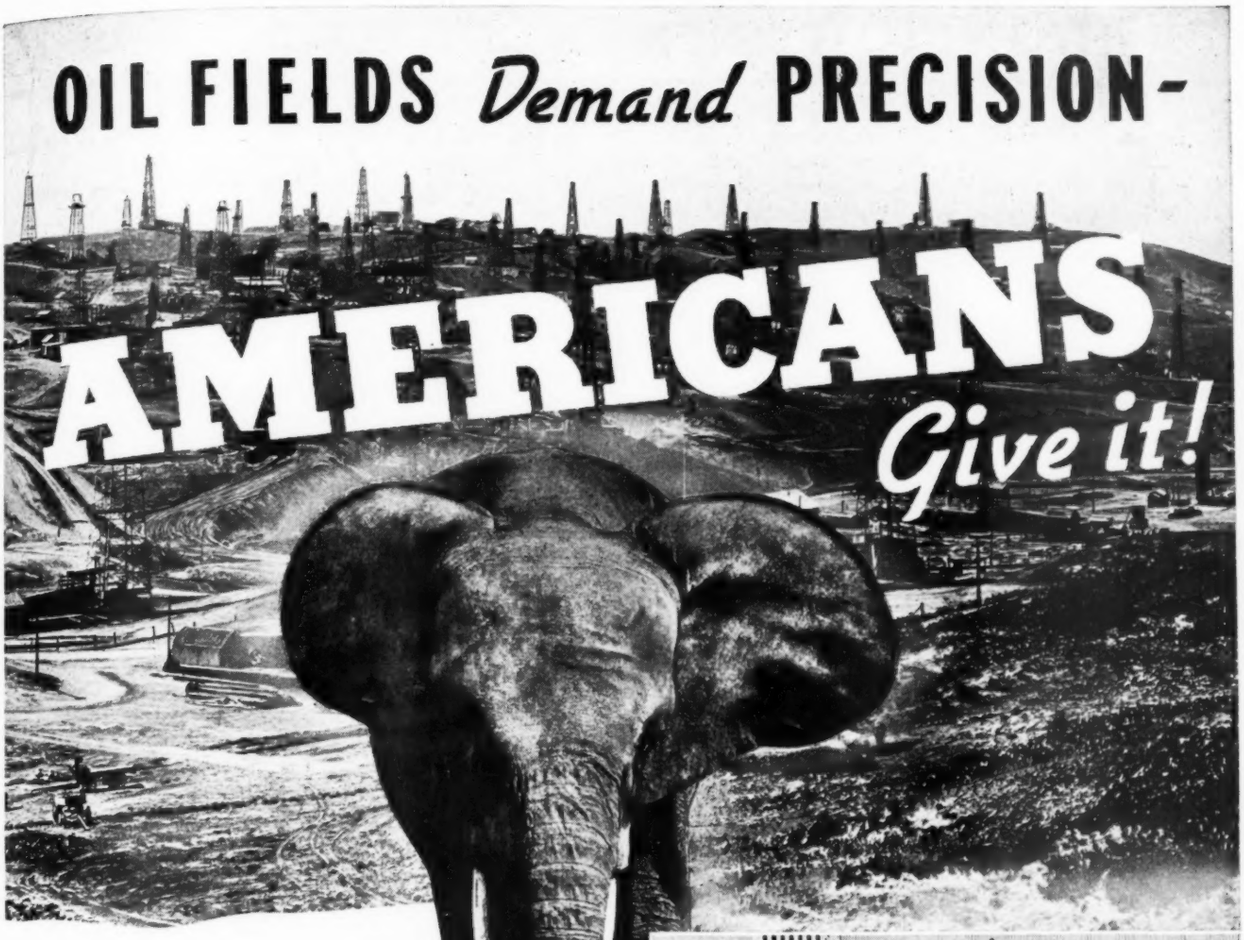

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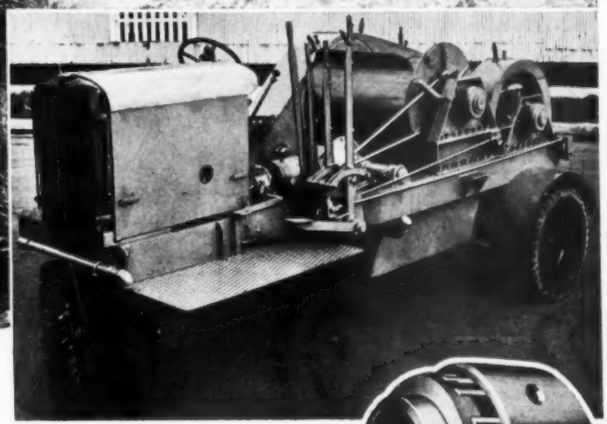

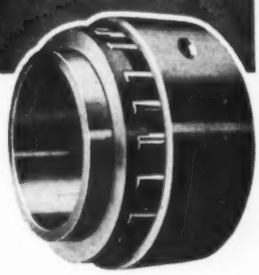

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ft. per bbl. of oil produced shall be allowed to produce daily only a total volume of gas equivalent to the volume obtained by multiplying the daily allowable, as determined by Rule 19, of the well by 3500 cu. feet. This amount of gas shall be known as the gas limit for oil wells. Monthly test reports must be made of all such wells. The change was effective April 1st.

o

California Oil Control Bill Favored

The Voluntary Committee of Independents, with headquarters in Los Angeles, has announced that signed petitions received by it indicate that a preponderence of independent operators in California favor the proposed state oil control bill. Most of the petitions urge immediate passage of the bill to protect the industry against threatened collapse of the price-wage structure, the committee reports. It is stated at committee headquarters that many operators who heretofore had opposed any suggestion of state control are lining up in favor of the measure, giving as their reason the belief that the bill is the only feasible means of obtaining the fast action required to meet the present emergency. Voluntary curtailment of production has helped the situation in some degree, but refusal of a minority to join in the program is proving a stumbling-block to the necessary unanimous coöperation, it is stated.

The principal provisions of the bill are for active regulation of the industry by three salaried commissioners appointed by the governor of the state and subject to recall by the industry, these commissioners to make the regulatory orders as provided under the provisions outlined in the bill. The measure favors the producers of small or marginal wells. The act provides every producer and refiner with an opportunity to present his complaint against any order at an office close to his operations.

o

Pennsylvania Probe Ruled Invalid

A legislative inquiry to determine whether Pennsylvania's oil industry should be regulated by the state has been ruled unconstitutional by the Dauphin County Court. Judge John E. Fox has held that the 1937 legislature should have created the five-man investigating commission by passage of a bill instead of by adopting a joint resolution. He made permanent an order restraining the commission from continuing its inquiry and ordered the state treasurer to refrain from paying further bills of the commission from a $50,000 appropriation.

"The joint resolution is a violation of the declaration of rights," Judge Fox ruled.

o

Seek New Method of Determining Well Potentials

A method of determining oil-well potentials without taking physical tests is being sought by a committee of Kansas operators working in conjunction with the Kansas State Corporation Commission. The method under consideration has its foundation in well depths, as follows:

Wells to 2500 ft. in depth would be given 15 bbl.; 2500-3000 ft., 17½ bbl.; 3000-3500 ft., 20 bbl.; 3500-4000 ft., 22½ bbl.; 4000-4500 ft., 25 bbl.; and 4500-5000 ft., 30 barrels.

After allocations have been made in accordance with depths on this scale, the rest will be distributed among the wells according to a curve.

Ruling Expected to Aid Owners of Small Tracts

An opinion by the Third Court of Appeals at Austin, Texas, may have the effect of broadening oil-well spacing regulations of the Railroad Commission and result in the development of many small tracts of land. In its decision the court held that the commission was right in granting a permit to drill on a .53-acre tract in Gregg County, East Texas field. The Shell Petroleum Corporation had appealed from a trial court decision upholding the commission.

In sustaining the trial court the appellate bench ruled specifically it is not a voluntary subdivision of land, as condemned by the Supreme Court, when an oral partition of a tract is later ratified by deeds prior to the discovery of oil in the area.

The tract in question originally was part of 68½ acres that was partitioned by oral agreement into four 17-acre lots, leaving undivided among four heirs the .53-acre portion. The heirs at various times leased their respective 17-acre parcels for mineral development but never the 68½ acres as a whole.

Attorney-General William McCraw said the court's opinion "will be the means of giving many farmers and small land owners an opportunity to share in the oil industry. It gives sanction to our opinion that every individual owner of a small tract has a right to its proper development."

o

Propose Control Alberta Oil Industry

Passage of a bill for the conservation of oil and gas resources, now before the legislature, would virtually vest control of the Alberta, Canada, oil industry in a board of three members. The bill goes further than providing for conservation, however, as the board would have power to prorate production of crude petroleum or natural gas from wells in any area in a manner to prevent a reduction of price, and assure that an equitable share of the available markets for petroleum or natural gas be available to the owner of each producing well.

o

California Well Breaks Depth Records

The Continental Oil Company's No. A-2 K.C.L., five miles west of Wasco in Kern County, California, was drilled to a total depth of 15,004 ft., establishing a world's depth record. The upper levels were then tested by electrical logging and production obtained from a zone just below 13,000 feet. Initial production was 591 bbl. in 24 hours through a ¼-in. bean, the gravity of the oil being 37.1 deg. A.P.I. No. A-2 K.C.L. thus becomes the world's deepest producing well. (See article in this issue).

o

Court Denies Writ in Spacing Case

The Texas Supreme Court has declined to review the second appeal in the Brown case, concerned with the spacing of oil wells. The second appeal was made by the Humble Oil and Refining Company after a lower court upheld validity of an exception to Rule 37 granting a permit to C. H. Brown to drill a well on a one and one-half acre tract in the East Texas field. The Third Court of Civil Appeals affirmed the decision and now the Supreme Court has dismissed an application for a writ of error.

Litigation in the case, which has established precedents, originated in 1933 when the oil company attacked an order of the Texas Railroad Commission that permitted a second well on a th[illegible]-acre tract.

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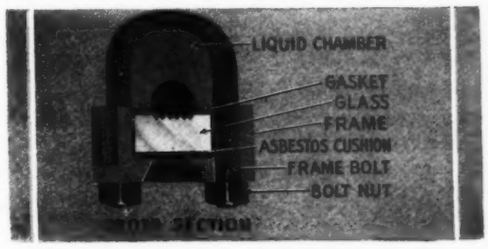

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Latest Activities In The Oil Fields

A NEW North Texas deep field has been opened by Hull, Silk, et al's No. 1 L. F. Wilson in Block 25, A. T. N. C. L. Survey, three miles southeast of Holliday in Archer County, Texas, which had an initial production of 127 bbl. per hour on official test through ¾-in. tubing choke. Most of the Hull and Silk interest has been purchased by Helmerich and Payne and Blackwell Oil and Gas Company and the new owners have filed application with the Railroad Commission to classify the new area, known as the Panther pool, as separate from the K. M. A. field of Wichita and Archer counties. At present the distance between the two areas is about six miles. Temporarily the allowable has been set at 100 bbl. per day, as compared with the K. M. A. allowable of 58 bbl. per day. This discovery has given added impetus to the intensive wildcatting campaign in northern Archer County.

●

R. L. Kemp et al's No. 1 Rafferty, in SE SE NE of 6-18-5e, southeastern Payne County, Oklahoma, flowed by heads through a bridge formed when high-pressure gas blew the tools up the hole. Despite this obstruction, the well flowed an estimated 35 bbl. of oil per day from Wilcox sand at a depth of 3665 to 3666 feet. The well is about five miles north of Cushing.

●

West of Marlow in northwestern Stephens County, Oklahoma, Coline Oil Company's No. 1 Johnson, in SW SE NE of 1-2n-8w, flowed by heads at the rate of 60 bbl. per hour after a bridge near the bottom of the casing had been removed and the well swabbed several times. The well was drilled to a depth of 10,001 ft. and plugged back to 9086 ft. and 5-in. casing set and cemented at 8997 feet.

●

Continental Oil Company and Cities Service Oil Company's No. 1 Morrell, in SW NE NE of 15-9s-21w, southeast of Hill City, southeastern Graham County, Kansas, was treated with 1000 gal. of acid and swabbed 50 bbl. of oil per hour from Arbuckle lime at a depth of 3712 to 3719 ft., without lowering the fluid level. This is the first oil well in this northwestern Kansas county.

●

More than two miles southeast of the nearest Jal sand production in southeastern Lea County, New Mexico, George F. Getty's No. 1 Riggs, in 1-26s-37e, flowed at the rate of 20 bbl. per hour through 2-in. choke in 2½-in. tubing. Through 1/64-in. choke it flowed 45 bbl. in 14 hours. The well was drilled to a depth of 3358 ft. and plugged back to 3346 and was shot with 260 qt. between 3234 and 3346 feet.

●

Humble Oil and Refining Company and Sun Oil Company's No. 1 H. H. Dailey, in the Juan de la Reviera Survey, three and a half miles southeast of Navarro Crossing in northwestern Houston County, Texas, flowed oil and wash water at the rate of ten bbl. per hour through 5/64-in. choke. Gas production was estimated at 200,000 cu. ft. per day. Tubing pressure was 1275 lb., casing pressure 250 pounds. The well produces from Woodbine sand. It was drilled to a depth of 5920 ft., 5½-in. casing set and cemented and plug drilled to 5898 ft., and casing perforated with 12 shots between 5891 and 5893 feet.

●

Four miles west of the Yates field, Pecos County, Texas, the Cardinal Oil Company's No. 1-36 White and Baker, in Section 36-Z, T. C. R. R. Survey, flowed 21 bbl. of 29-deg. gravity oil in seven hours through 2-in. tubing, and produced 500,000 cu. ft. of gas per day. The well was originally drilled to a depth of 1802 ft. and was plugged back to 1639 ft. to shut off sulphur water, and was then shot with 80 qt. between 1618 and 1639 feet.

●

H. L. Lockhart's No. 1 A. R. Huesinger, in Section 67-29, W. & N. W. Survey, southeastern Howard County, Texas, two miles northeast of the Chalk pool and four miles southwest of the Snyder pool, gauged 936 bbl. per day on official test. The well was drilled to a total depth of 2925 ft., and shot.

AVERAGE CRUDE PRICES

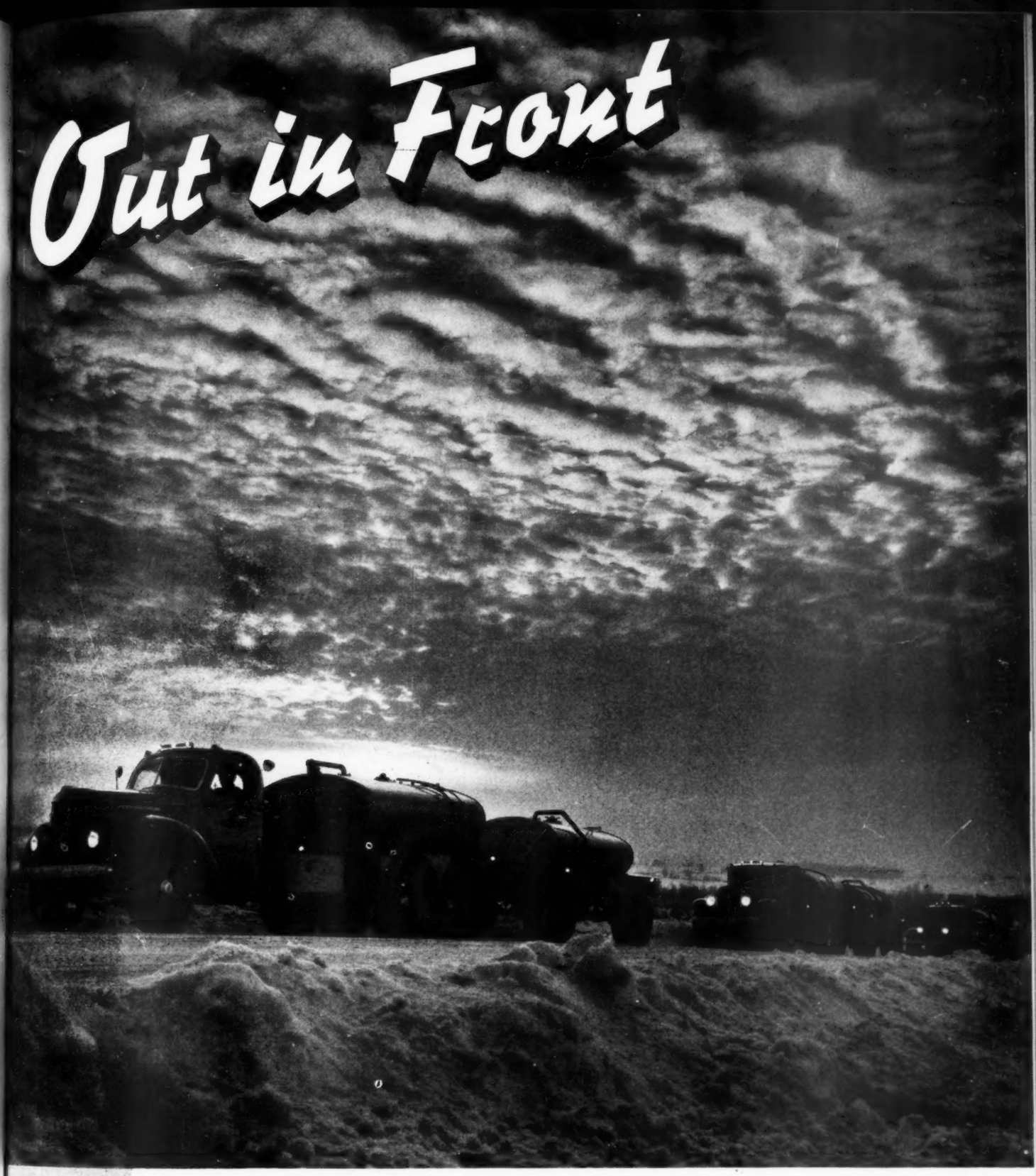
California	
Kettleman Hills	$1.19-1.43
Playa Del Rey	.80-1.16
Coalinga	.70- .90
Signal Hill	.80-1.21
Montana	1.35
Wyoming	.97-1.30
Colorado	1.12-1.18
New Mexico	.78-1.08
Texas	
North Central	.96-1.20
Panhandle	.91-1.08
West Texas	.78-1.08
Gulf Coast	.95-1.41
Darst Creek	1.09
East Texas	1.35
Talco	.73
Kansas	.98-1.30
Oklahoma	.98-1.30
Arkansas	.90
Louisiana	
Rodessa	$ .91-1.25
Gulf Coast	.84-1.41
North Louisiana	.90-1.22
Illinois	1.35
Kentucky	1.40
Indiana	1.12
Ohio	
Lima	1.25
Michigan	1.27
Pennsylvania	
Bradford	2.05
Southwest	1.71
Eureka	1.65
Buckeye	1.55
Corning	1.27
West Virginia	1.67
Canada	2.10-2.17

DAILY AVERAGE CRUDE OIL PRODUCTION

Data Supplied by A.P.I.

(Figures in Barrels)

	B. of M. Dept. of Int. Calculations (April)	Week Ended April 2, 1938	Week Ended March 5, 1938	Week Ended April 3, 1937
Oklahoma	526,500	491,850	522,450	648,700
Kansas	173,000	166,400	166,900	189,200
Panhandle Texas	.....	66,650	67,300	75,250
North Texas	.....	72,600	65,150	68,300
West Central Texas	.....	28,950	26,350	33,150
West Texas	.....	191,950	180,950	208,300
East Central Texas	.....	98,950	90,550	123,450
East Texas	.....	429,700	426,500	455,750
Southwest Texas	.....	229,900	218,850	224,350
Coastal Texas	.....	202,200	194,100	208,750
TOTAL TEXAS	1,329,800	1,320,900	1,269,750	1,397,300
North Louisiana	.....	80,250	80,000	71,650
Coastal Louisiana	.....	182,200	176,750	174,400
TOTAL LA.	239,800	262,450	256,750	246,050
Arkansas	40,000	54,400	49,800	27,450
Eastern	132,600	142,600	134,050	116,000
Michigan	51,400	52,850	50,200	40,100
Wyoming	46,600	48,550	47,500	49,000
Montana	12,700	13,500	12,100	14,800
Colorado	4,600	4,300	4,350	4,200
New Mexico	106,000	104,950	105,050	102,950
TOTAL EAST OF CALIF.	2,663,000	2,662,750	2,618,900	2,835,750
California	698,700	704,500	720,800	586,600
TOTAL U. S.	3,361,700	3,367,250	3,339,700	3,422,350



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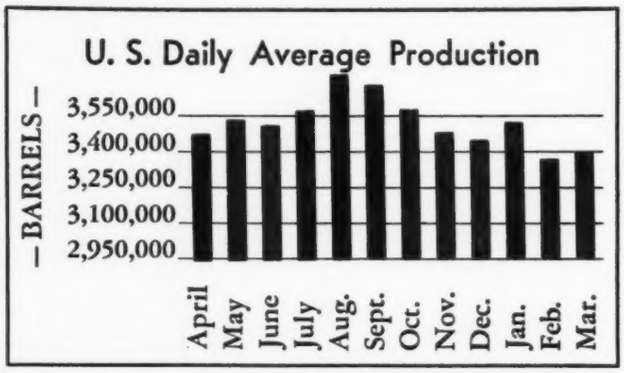
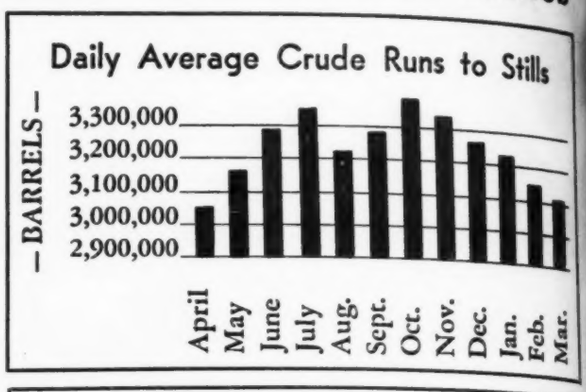
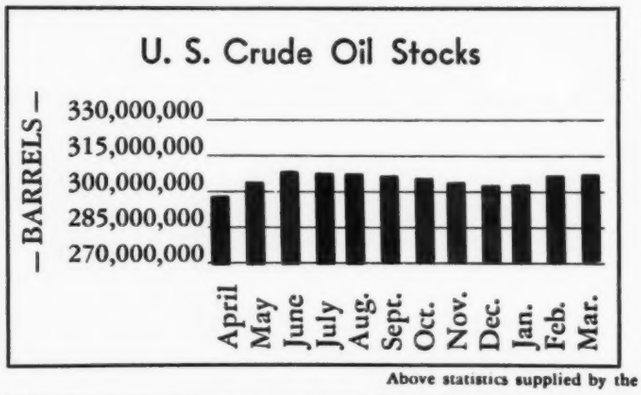
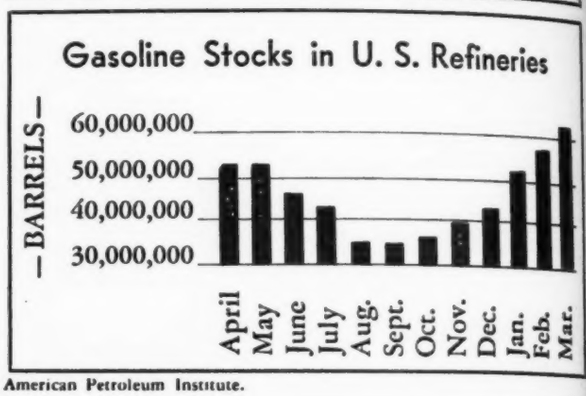
OIL AND GAS WELL CHEMICAL SERVICE

Summary of Petroleum Statistics and Field Activities









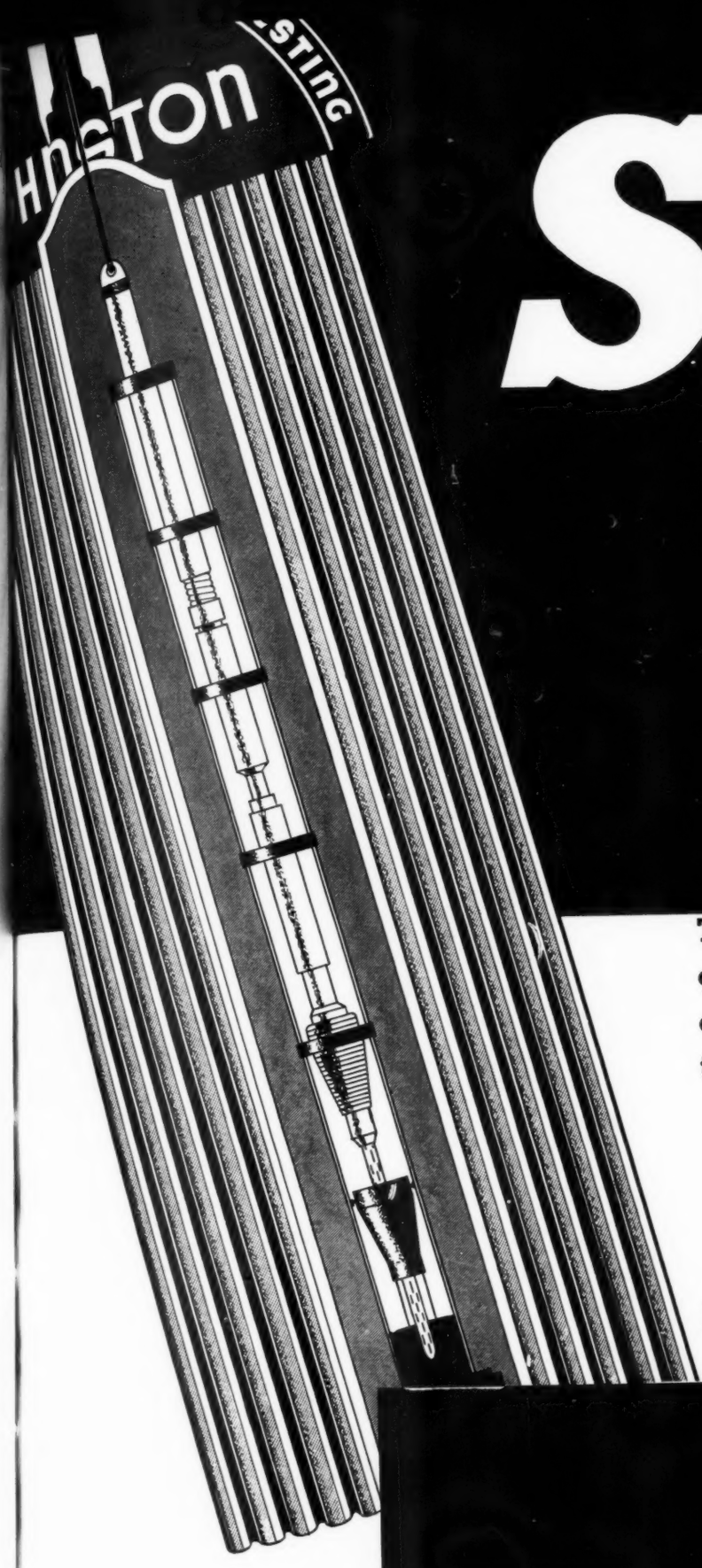
Above statistics supplied by the American Petroleum Institute.

Summarized Operations in Active Fields for March, 1938

Fields	Completions	Producers	Rigs	Drilling Wells	Depth of Production	No. Casing Strings	Gravity of Oil	Type of Tool Used
Texas								
East Texas	208	205	44	80	3500-3700	2	40	Rotary
Duval County	47	36	6	25	1554-2900	2	22	Rotary
Ector County	52	49	18	122	3675-4377	2 and 3	32-36	Rot.-Cab.
Panhandle	52	51	52	163	1700-3900	2	40	Rotary
Refugio County	23	19	2	12	4900-5900	2	38	Rotary
Nueces County	35	28	13	40	3922-5878	2 or 3	21-54	Rotary
Winkler County	20	20	8	21	2850-3450	2 and 3	30-38	Rot.-Cab.
Talco Field	10	9	2	5	4230-4361	2	16-24	Rotary
K. M. A. Field	67	63	26	146	3730-3935	2	42-43	Rot.-Cab.
Oklahoma								
Oklahoma City	4	3	3	12	6450-6682	3	39	Rotary
Fitts Pool	17	13	2	9	1800-4488	2 or 3	38	Rotary
Kansas								
Russell County	29	27	7	43	2926-3435	2 and 5	32-37	Rot.-Cab.
Rice County	18	14	5	24	3222-4085	2 and 5	42-48	Rot.-Cab.
Barton County	18	13	7	25	3290-3518	2	39-42	Rot.-Cab.
Louisiana-Texas-Arkansas								
Rodessa	20	19	5	35	5950-6450	3	39	Rotary
Illinois								
Central Illinois	65	50	26	121	2950-4100	2	36-38	Rot.-Cab.
New Mexico								
Lea County	40	36	14	101	3150-4030	3	30-34	Rot.-Cab.
California								
Kettleman Hills	0	0	2	14	8300-8730	3 or 4	40	Rotary
Wilmington	26	26	40	42	3500-4000	2 and 3	18-20	Rotary

Field Activities by States for March, 1938

State	Completions		Producers		Locations		Rigs		Drilling Wells		Production, 1937 (In Barrels)
	March	February	March	February	March	February	March	February	March	February	
Arkansas	16	15	14	11	20	20	21	20	34	32	12,088,341
California	84	95	80	75	132	82	116	105	247	254	238,587,663
Colorado	1	....	1	....	....	....	3	2	24	26	1,532,893
Illinois	71	57	46	35	....	....	131	135	39	37	7,376,022
Indiana	17	7	10	1	....	....	3	2	28	33	820,000
Kansas	141	127	101	77	126	144	47	52	281	307	70,542,000
Kentucky	57	50	41	40	....	....	8	10	75	78	5,500,000
Louisiana	81	69	64	47	94	157	51	60	180	229	90,501,068
Michigan	63	65	39	43	81	38	25	32	130	138	16,254,181
Mississippi	2	3	2	0	....	....	4	2	6	7	Gas Prod.
Montana	6	2	4	2	....	....	2	3	49	45	5,775,000
New Mexico	45	33	39	28	....	....	11	13	171	150	38,642,184
New York	....	8	....	7	....	....	....	....	....	....	5,466,200
Ohio	79	70	61	52	....	....	54	49	147	161	3,547,600
Oklahoma	170	181	118	128	167	191	46	45	318	333	225,402,731
Pennsylvania	....	....	....	....	....	....	....	....	....	....	19,154,400
Texas	1109	963	873	769	1407	1217	369	354	1271	1292	506,891,233
West Virginia	65	65	56	58	....	....	25	30	120	151	3,833,000
Wyoming	10	4	9	4	....	....	8	8	68	77	19,402,121
Total	2017	1814	1558	1377	2027	1849	924	922	3188	3350	1,271,316,637



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Progress of Major Pipe Line Work

THE Continental Oil Company has begun construction of a 6-in. pipe line from the Villeplatte field to Tepetate, Evangeline Parish, Louisiana. The line will have a capacity of 12,000 bbl. per day, and will connect Villeplatte with Continental's Louisiana pipe line system at Tepetate and link it directly with the company's deep-water terminal at Lake Charles.

The Villeplatte field was discovered within recent months by the Continental. Two wells have been completed in the area and several more are being drilled. Continental has a block of 7825 acres in the area and in addition to the pipe line is constructing a 35-mile telephone system connecting Villeplatte, Tepetate, and its Basile loading station. Completion of the project is scheduled for April 25th.

●

W. G. "Bill" Hanrahan, Dallas, Texas, has completed laying for the Humble Pipe Line Company 11 miles of 6-in. pipe line from Humble's Judkins station in the Judkins pool, Ector County, Texas, northeastward through the Harper pool to the Odessa station. It parallels the Humble's existing 8-in. line between the two stations. The latter line extends on northward into Andrews County. The new line will serve both the Foster and Harper pools as the existing outlet for the two areas was overloaded.

●

T. R. Jones, Dallas, Texas, pipe line contractor, has completed laying an 8-in. line for the Texas-New Mexico Pipe Line Company from the Lynch pool, Lea County, New Mexico, to the Vacuum pool, 18 miles to the south. Fourteen miles of 8-in. pipe was laid, tying in with four miles of 4-in. on the Lynch end of the line. At present Jones is laying a gathering system for the company in the Vacuum pool, consisting of 16 miles of 4-in. and 6-in. pipe.

This gives the Vacuum pool, one of the most active areas in Lea County, its first pipe line outlet. Heretofore oil produced in the area was stored in the 80,000-bbl. storage tank of the Magnolia Petroleum Company at the north end of the pool.

●

The Royalite Oil Company's 6-in. pipe line being laid between the Turner Valley field and Calgary, Alberta, Canada, is expected to be completed by May 1st. Late in 1937 a 15-mile 6-in. loop was laid to a 4-in. line 15 miles from Turner Valley, increasing the line's capacity to 13,000 bbl. per day. The 6-in. loop now nearing completion extends from the junction, 15 miles north of Turner Valley, to Calgary, and will further increase the capacity of the line to 24,000 bbl. per day.

●

The Mene Grande Oil Company, Venezuela subsidiary of the Gulf Oil Corporation, has promised east-central Venezuela its second pipe-line outlet to the sea sometime in 1938 or 1939. The company is now constructing a road from Oficina to Guanta, a seaport on the northern coast of Venezuela. The road is being built through virgin territory and is the initial step leading to the construction of the pipe line. The road is needed before line pipe and other materials can be strung along the right-of-way of the line. The pipe line will be approximately 150 miles in length.

A protest has been filed against the Canyon-Payette Oil Company's application for a permit to lay a natural gas pipe line from Weiser to Boise, Idaho, a distance of approximately 100 miles. The city of Boise has filed the protest with the State Public Utilities Commission.

The protest states that the "applicant does not now have developed a sufficient quantity or quality of gas and oil, and that there are other companies drilling in the same field for natural gas and oil, and that if the applicant is granted a certificate it will greatly retard development of gas and oil resources of the state, and that the application is premature."

●

The Standard Pipe Line Company of Louisiana has awarded a contract to the Latex Construction Company of Houston, Texas, for the construction of a 4-in. line from the Cotton Valley field, Webster Parish, Louisiana, to its Weller station, a distance of 12 miles. At Weller the line will tie in with the Standard's trunk line to Baton Rouge.

●

The possibility of constructing pipe lines from the Turner Valley field, Alberta, to Vancouver on the Pacific Coast and to Fort William at the head of the Great Lakes is being discussed in Canadian circles. The projects are being advocated as war measures. W. S. Campbell, president of the Petroleum Producers' Association, is one of the principal advocates of the plan, and he suggests the Dominion government guarantee bonds for the undertaking, pointing out that Great Britain is interested in obtaining an adequate supply of oil within the Empire that would be available in event of war.

The line to Vancouver would make crude oil available at that port throughout the year. The line to Fort William would make oil supplies available to eastern seaports eight months of the year, or during the Great Lakes navigation period.

Construction of the two lines would involve an estimated expenditure of $25,000,000.

●

The East Texas Refining Company has completed the laying of an 8-in. pipe line from the Miller County, Arkansas, extension of the Rodessa field to its refinery in the town of Rodessa on the Louisiana side of the field.

●

The Derby Oil Company is laying a 4-in. lateral from its Bell station in the Burrton pool, Kansas, to a new discovery well three miles southwest of Buhler in northeastern Reno County, a distance of six and one-half miles. The Bell station is on the company's trunk line.

●

Humble Oil and Refining Company has begun work on the construction of a pipe-line lateral from the new Cedar Point oil pool in Galveston Bay, Texas. A 4-in. line, 6.2-miles long, will be laid from tank battery on the mainland to the Humble Pipe Line Company's trunk line at Goose Creek. From Goose Creek the oil will be transported to Baytown, Webster, and other coastal terminals of the company.

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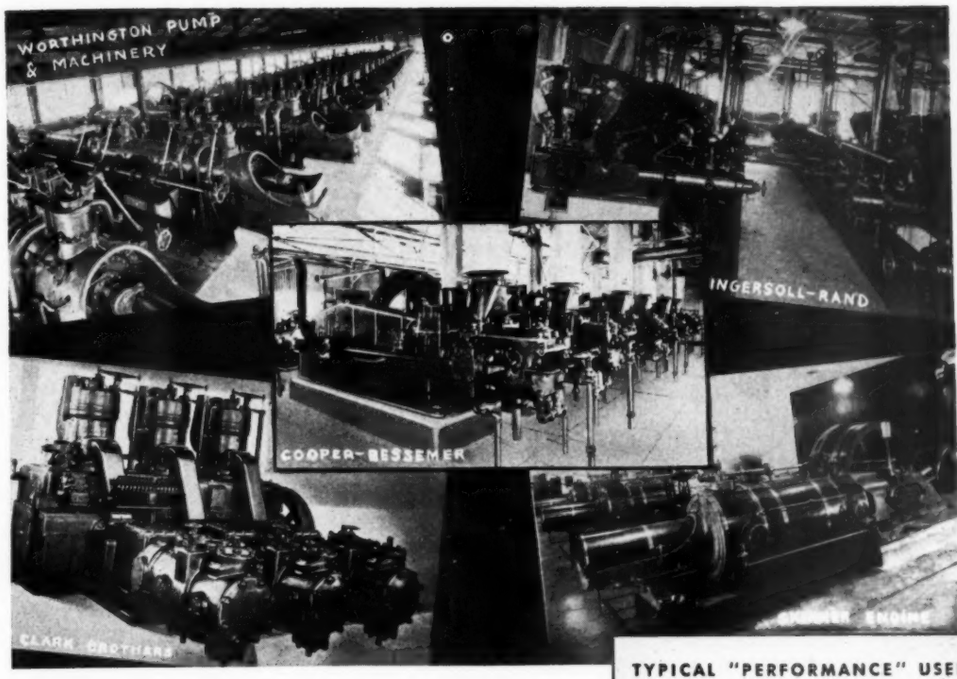

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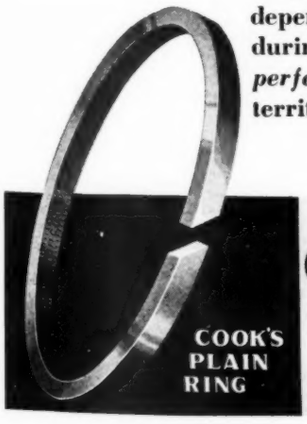
50TH ANNIVERSARY



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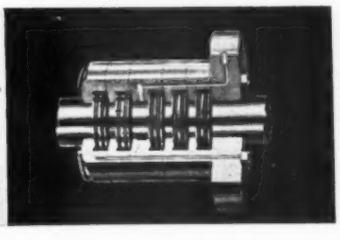


The Month's Activities in Refining

Percent Refining Capacity Operated

Western Division, 66.5 Percent **Central Division, 72.4 Percent** **Eastern Division, 80.2 Percent**

THE Continental Oil Company, Ponca City, Oklahoma, has announced plans for the construction of a casinghead gasoline plant in the K. M. A. field in the North Texas area. The initial capacity of the plant will be 15,000,000 cu. ft. of gas per day, and the design will be such that units can be added when needed to increase this capacity. According to J. G. Dyer, manager of the production department of Continental, large-diameter gathering lines will be provided so that gas can be brought from a considerable distance. Residue gas from the plant will be returned to producing leases for repressuring the wells.

●

Wilshire Oil Company, Inc., of Los Angeles, has announced it will install a Dubbs reforming unit having a rated charging capacity of 4000 bbl. of naphtha per day. The unit will be operated under license from Universal Oil Products Company of Chicago. At the same time, Wilshire will add a crude heater to its existing Dubbs simultaneous skimming and cracking unit, designed to handle 18,000 bbl. of crude per day. The addition of this heater will enable the topping and reforming sections to be operated independently of the cracking unit.

The operations of the new reforming unit and crude heater will mesh with those of the Dubbs combination 2-coil selective cracking unit and the Universal Oil Products' catalytic polmerization unit previously installed. The three Universal processes will work together to increase the overall capacity of the refinery and raise still further the average octane number of the several grades of gasoline produced.

●

A refinery has been completed in the San Lorenza state oilfields near Rosario, Argentina, which it is expected may result in lower-priced fuel in that South American republic. Federal petroleum reserves now comprise approximately 386,000 sq. miles. Production from state-owned wells for the first half of 1937 totaled 3,900,252 bbl., an increase of 14.5 percent over the similar period of 1936.

Inland Empire Refineries, Inc., has under construction a refinery at Spokane, Oregon, which is expected to be in operation in July. Its capacity will be 2500 bbl. per day. The Idaho Refining Company, an affiliate, has under construction a 1500-bbl. refinery at Pocatello, Idaho.

●

Construction work has begun on the Portex Oil Company's gas-recycling plant on the company's Pickering Lumber Company lease in the Hanson Survey of Shelby County, Texas, where it has three gas-distillate wells. The plant is expected to be in operation early in May. Officials of the company state that gas will be taken from two of the wells and gas from the third will be used for repressuring. The plant will be the first of its kind in the area, it is stated.

●

Socony-Vacuum Oil Company, Inc., has purchased from Universal Oil Products Company full operating rights under all of Universal's pyrolytic cracking patents.

The price is understood to be several millions. Socony-Vacuum also acquires rights, conditionally, under other Universal patents as well.

●

C. H. Lebow has made application with the Kansas Corporation Commission for increased allowables in the Bemis pool of Ellis County to make possible the financing of a 1500-bbl. refinery near the pool. Lebow's application stated that because of "limited pipe line facilities" operators have been able to produce only 65 to 80 percent of allocations and that a back allowable of approximately 260,000 bbl. has been accumulated. Lebow has asked for an increase in the present allowables, which would enable him and other operators to finance construction of a refinery and a pipe line.

●

Construction of a casinghead gasoline plant in the Long Lake field, Anderson County, Texas, will begin in the near future, it has been announced. Those behind the project are George E. Lilly, an independent operator of Houston, Texas, and A. E. Chimene, New York City. Residue gas will be returned to producing zones for repressuring.

Crude Runs to Stills, Gasoline and Gas and Fuel Oil Stocks
Week Ended April 2, 1938

A.P.I. Figures

(Figures in Barrels of 42 Gal. Each)

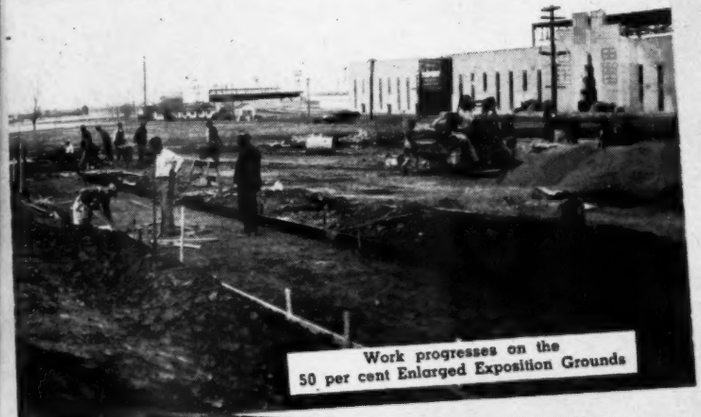
DISTRICT	Percent Potential Capacity Reporting	Daily Avg. Crude Runs to Stills	Percent Operated of Total Capacity Reporting	Total Motor Fuel Stocks Thousands of Bbl.	Gas and Fuel Oil Stocks Thousands of Bbl.
East Coast	100.0	517,000	77.3	22,934	9,347
Appalachian	88.4	103,000	79.8	3,551	1,291
Ind., Ill., Ky.	92.4	409,000	83.6	15,394	7,158
Okla., Kans., Mo.	84.7	261,000	68.1	7,893	3,432
Inland Texas	56.6	128,000	63.7	2,678	1,584
Texas Gulf	95.7	734,000	92.1	13,740	8,246
La. Gulf	96.6	128,000	76.2	2,721	2,812
No. La.-Ark.	63.7	36,000	62.1	487	514
Rocky Mt.	69.7	40,000	64.5	2,296	785
California	90.9	512,000	68.6	16,270	85,952
Reported	89.0	2,868,000	77.5	87,964	121,121
Est'd Unreported	.....	277,000	.....	4,960	2,500
*EST'D TOTAL U.S. Apr. 2, '38	.....	3,145,000	.....	92,924	123,621
*EST'D TOTAL U.S. Mar. 26, '38	.....	3,080,000	.....	92,858	122,969
U.S. B. of M. *April 2, 1937	.....	**3,119,000	.....	81,585	95,096

*Estimated Bureau of Mines' basis.
**April, 1937, daily average.

PREPARE FOR LARGE ATTENDANCE FROM ALL NATIONS AT TULSA OIL SHOW

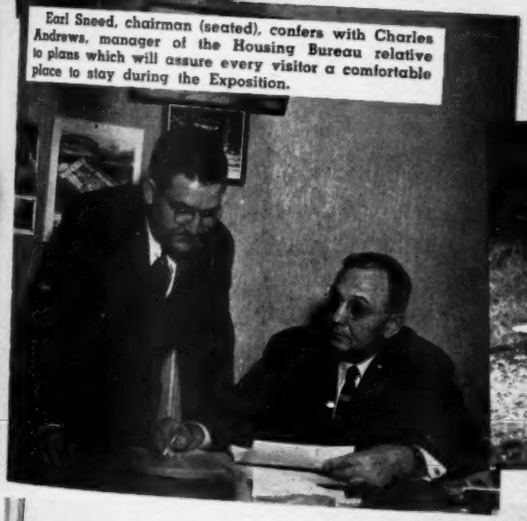
James H. Gardner, chairman of the International Petroleum Exposition international delegates committee, pins a delegates badge on Maurice Duperrey, president of International Rotary, as he stopped at the Tulsa airport. Duperrey, who resides in Paris, France, agreed to become an "ambassador" for the oil show. Madam Duperrey and General Manager of the Exposition Wm. B. Way are looking on.

Members of the Exposition International Delegates Committee. Seated, left to right: Joe H. West, Joe H. West & Co.; James H. Gardner, chairman, Gardner Petroleum Corp.; Miss Marie Rankin, Seismograph Service Corp.; Bruce H. Harlton, Amerada Petroleum Corp.; Glenn A. Campbell, Campbell Drilling Co.; (standing) Max A. Jodeit, Worthington Machinery Corp. of Oklahoma; G. H. Westby, Seismograph Service Corp.; Paul M. Raigorodsky, Petroleum Engineering Corp.; W. G. Green, Seismograph Service Corp.; Wm. D. Morrer, Moorlane Company; and George F. Martin, Seismograph Service Corp.; all of Tulsa. This committee will take care of the delegates from 20 to 25 foreign nations who will attend the oil show at Tulsa May 14 to 21.

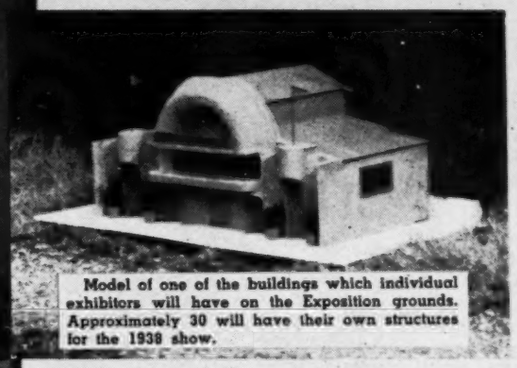


Work progresses on the 50 per cent Enlarged Exposition Grounds

Among the displays featuring the four major divisions of the industry 303 COMPANIES WILL HAVE EXHIBITS ON REFINING. New devices for greater efficiency, higher recovery, economy, and safety. Science of polymerization. Cracking and reforming of butane and pentane molecules. Vapor saving devices. Vapor plant recovery development. Processes for higher octane gasoline. Desulphating natural gasses to reduce hydrogen sulphide content, or complete elimination of sulphides. Processing of lubricants, greases, etc. Machinery for all the latest refining processes.



Earl Sneed, chairman (seated), confers with Charles Andrews, manager of the Housing Bureau relative to plans which will assure every visitor a comfortable place to stay during the Exposition.



Model of one of the buildings which individual exhibitors will have on the Exposition grounds. Approximately 30 will have their own structures for the 1938 show.

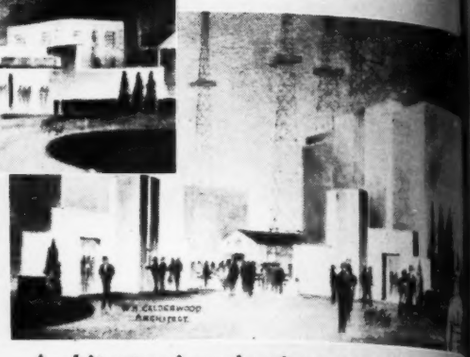
The Oklahoma State Highway Patrol makes plans to facilitate travel by automobile to the exposition.

General Manager Wm. B. Way, greets Roswell Rosengren, president of the National Junior Chambr of Commerce as plans are made for the Junior Chamber of Tulsa to sponsor a meeting of "young oil executives" during the Exposition. Wallace Franklin, past president of the Tulsa organization is looking on.

50 PERCENT LARGER INTERNATIONAL PETROLEUM EXPOSITION AT TULSA MAY 14 TO 21

Front to the New Oklahoma Building.

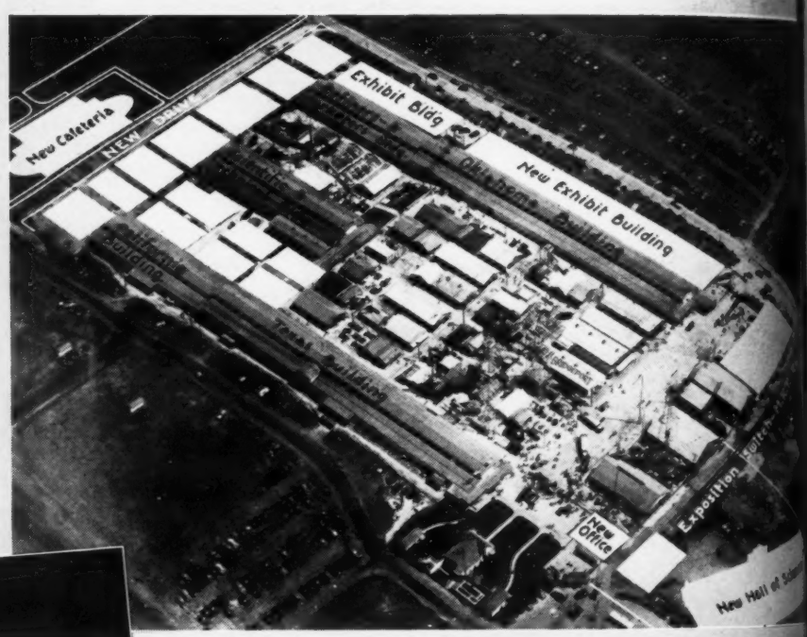
Architects view of one of the new entrances.



Architects view showing new entrance and new building along Drake Drive.

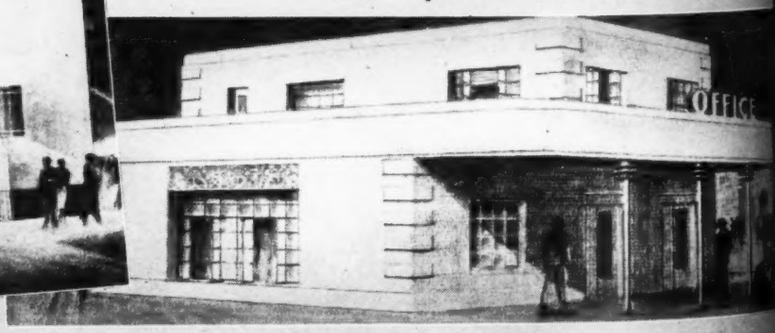
A $250,000 new building program is under way for the tenth International Petroleum Exposition at Tulsa to house the 50 percent larger show which will open May 14. This includes: two new exhibit buildings, a new cafeteria, a new Hall of Science, new office building, and ten new buildings being constructed by individual exhibitors.

According to Wm. B. Way, general manager, the 50 percent larger exposition will contain $10,000,000 worth of exhibits with: 402 companies having exhibits featuring drilling and production; 317 companies featuring transportation; 303 companies featuring refining; and 208 companies featuring marketing.



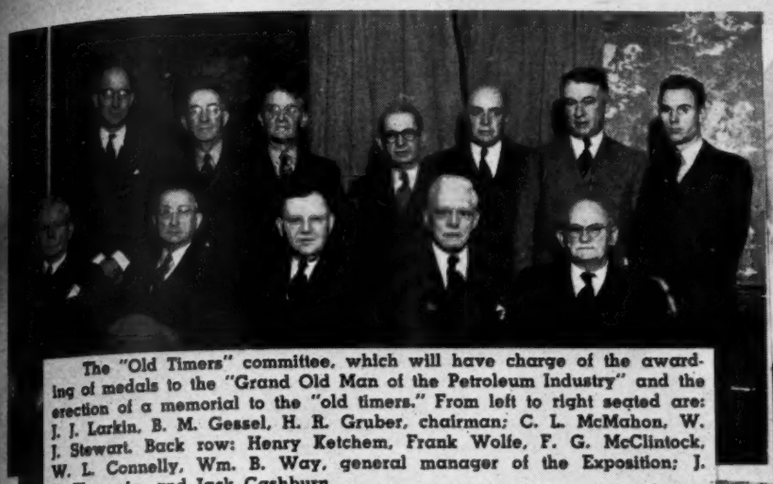
White spaces on aerial map show 50 percent increase space taken by these exhibitors.

New front to Texas building.

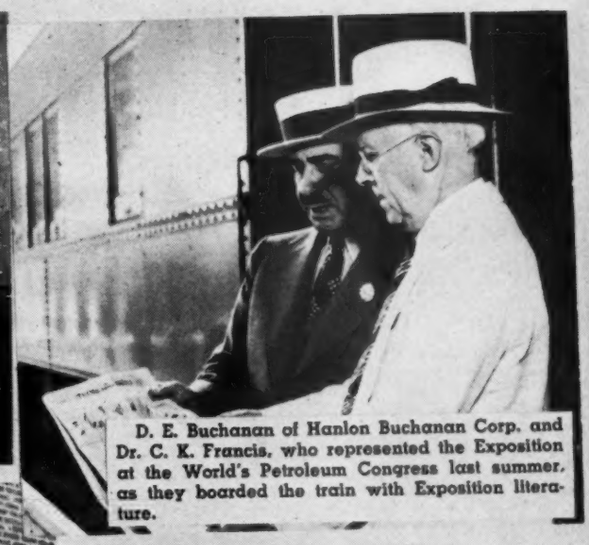


New Office Building.

INTERNATIONAL PETROLEUM EXPOSITION COMMITTEES AT WORK



The "Old Timers" committee, which will have charge of the awarding of medals to the "Grand Old Man of the Petroleum Industry" and the erection of a memorial to the "old timers." From left to right seated are: J. J. Larkin, B. M. Gessel, H. R. Gruber, chairman; C. L. McMahon, W. J. Stewart. Back row: Henry Ketchem, Frank Wolfe, F. G. McClintock, W. L. Connelly, Wm. B. Way, general manager of the Exposition; J. P. Flanagin, and Jack Cashburn.



D. E. Buchanan of Hanlon Buchanan Corp. and Dr. C. K. Francis, who represented the Exposition at the World's Petroleum Congress last summer, as they boarded the train with Exposition literature.

Members of the Transportation committee under the direction of A. F. Winn of the Skelly Oil Co. meet with Exposition officials on the Exposition grounds in front of the new Cafeteria to discuss plans for facilitating freight and passenger hauls to the grounds. Representatives of over 40 railroads and five airlines were present at an all day session.

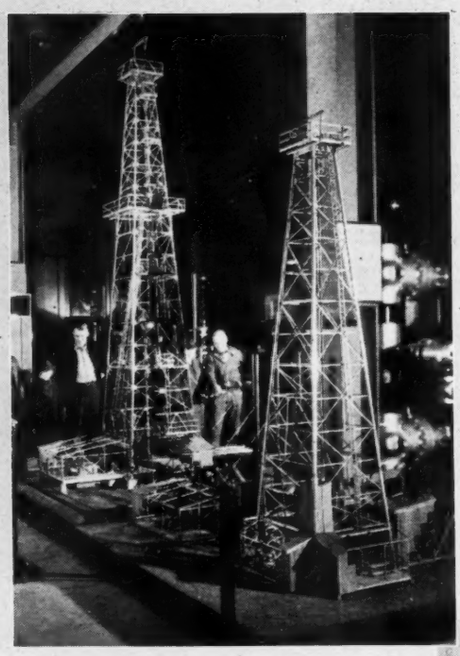
Among the displays featuring the four major divisions of the industry 317 COMPANIES WILL HAVE EXHIBITS ON TRANSPORTATION. Advances in facilities and equipment for handling pipe and trenching machines, in prevention of corrosion of pipe, and in cleaning and coating of pipe. Methods for cutting cost of pipeline upkeep. Cathodic, or electrolic protection of lines. Stove pipe welding, which cuts construction time and cost. Valves and control equipment. Pumps, engines and booster plant equipment. Safety and communication devices.

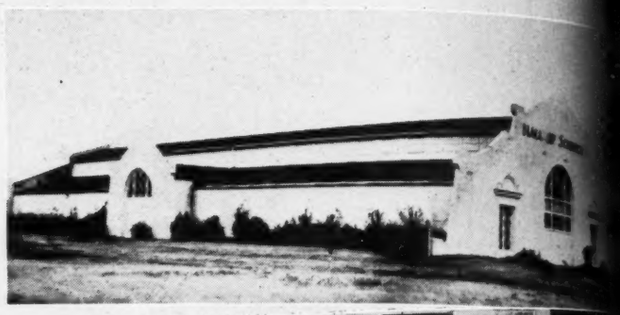
The Exposition gets the transfer men together to work out prices and rules to follow in transporting machinery from railroad cars to exhibit locations.

Workmen are planting a tree in front of the replica of the Drake Well, which is being fitted up as a clubhouse for the "Old Timers." The derrick tower had not been placed on the building when the photograph was taken.

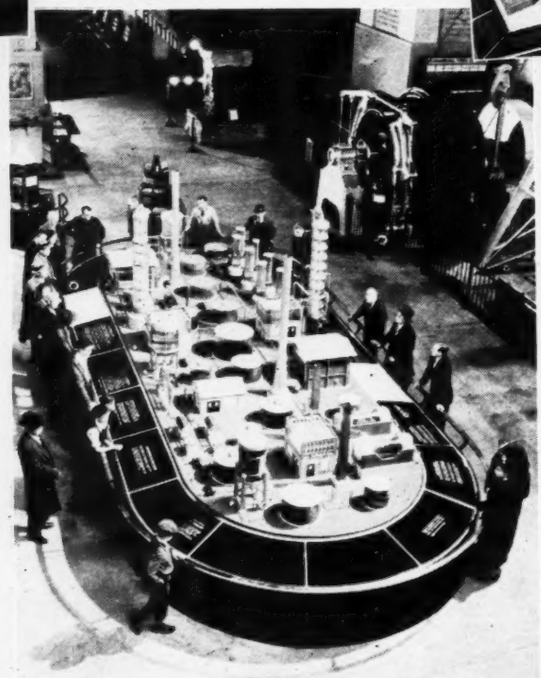
United States Senator Elmer Thomas presents General Manager of the Exposition Wm. B. Way, with a section of the Drake Well casing, which will be on display during the May 14 to 21 oil show.

$250,000 SCIENTIFIC EXHIBITS FOR INTERNATIONAL PETROLEUM EXPOSITION AT TULSA MAY 14 TO 21



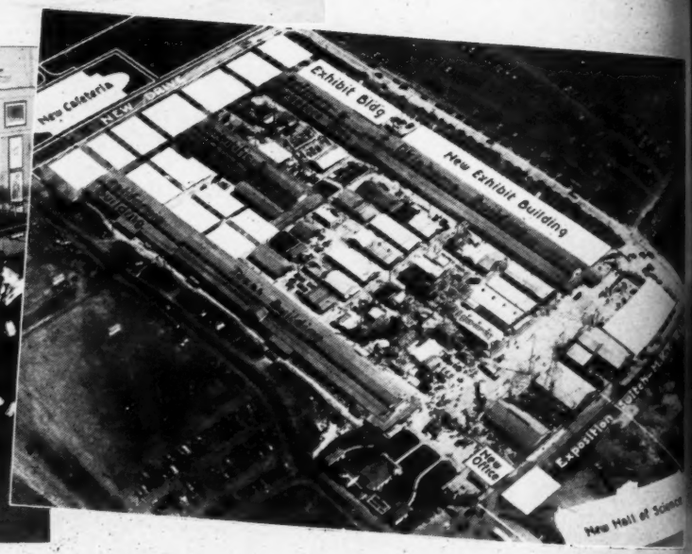


Largest display of Scientific and Technical Displays ever seen at any oil show planned by committee under Dr. Gustav Egloff for the May 14 to 21 Exposition at Tulsa.



Working models in the Scientific Exhibits cost over $250,000 to construct. Many of the exhibits being loaned to the Exposition by the Museum of Science and Industry in Chicago.

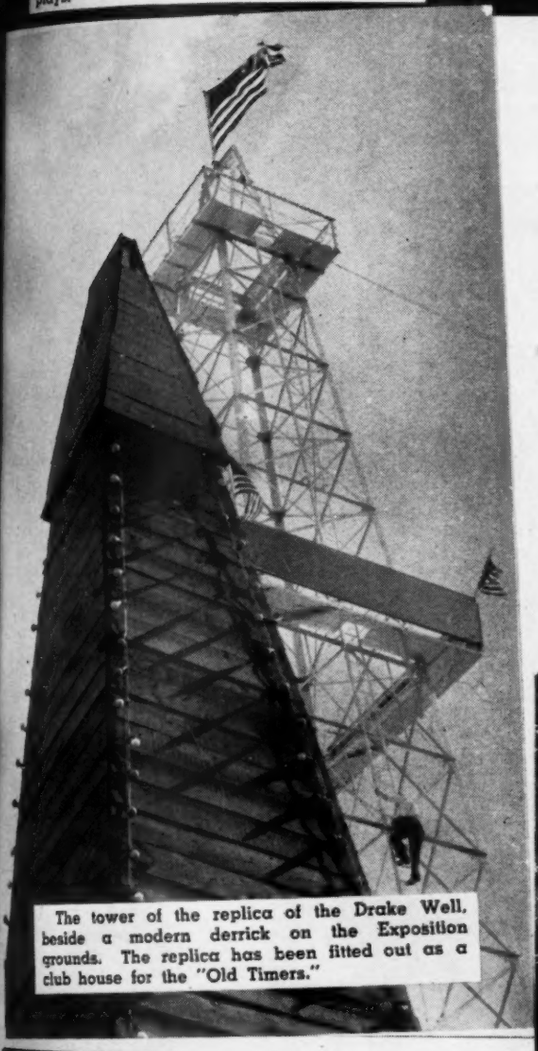
New Hall of Science, with three times the space heretofore provided for Scientific exhibits, to house displays featuring prospecting, drilling, transportation, refining, marketing, and the economics of the industry at the 50 percent larger Tulsa oil show. The white spaces in the aerial map show the increased exhibit space this year.



SAFETY DAY IMPORTANT EVENT AT TULSA PETROLEUM EXPOSITION

President W. G. Skelly of the Exposition (right) greets C. L. Cummings, President of the Cummings Engine Co., which will have a diesel engine exhibit in the Scientific displays.

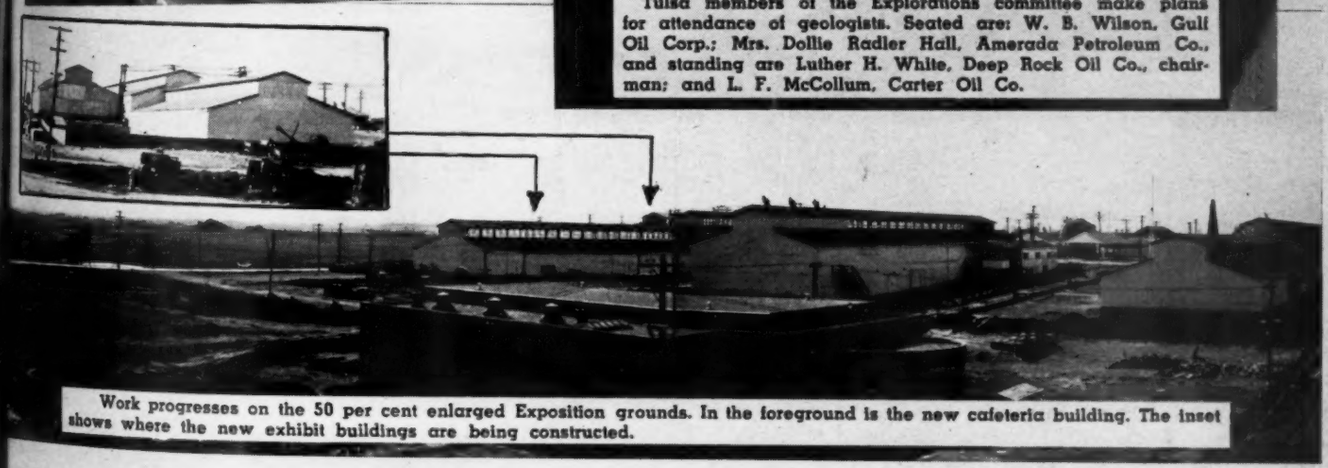
The Safety Committee of the Exposition making plans for the May 14 to 21 oil show at Tulsa. Safety Day, including the big demonstration of safety teams on Drake Drive will be held Friday May 20. From left to right are: (seated) J. W. Savage, Mid-Continent Petroleum Corp., Tulsa; H. W. Boggess, Sinclair Prairie Oil Co., Tulsa; T. A. Lytle, Cities Service Oil Co., Bartlesville; D. J. Wallace, Sinclair-Prairie Oil Co., Tulsa; L. E. Jennings, Stanolind Pipe Line Co., Tulsa; (standing) A. W. Letson, jr., Mid-Continent Petroleum Corp., Tulsa; H. T. Markee, Phillips Petroleum Corp., Bartlesville; F. K. Dalrymple, Tide Water Associated Oil Co., Tulsa; J. D. McCamey, Carter Oil Co., Tulsa.



The tower of the replica of the Drake Well, beside a modern derrick on the Exposition grounds. The replica has been fitted out as a club house for the "Old Timers."

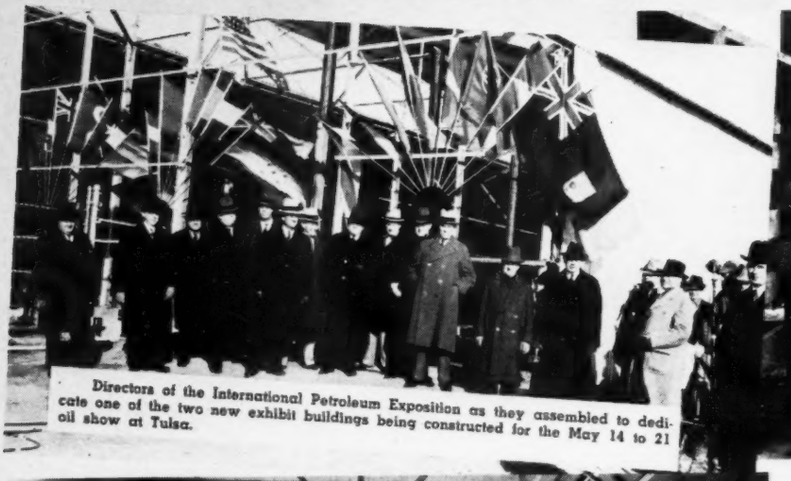
Among the displays featuring the four major divisions of the industry 208 COMPANIES WILL HAVE EXHIBITS ON MARKETING. The latest methods, machinery and equipment of interest to independent jobber, bulk station owner, operators and owners of service stations will be on display. The latest types of pit and pump island lighting units. Pressure grease guns. Loading racks. Dispensing units. Unloading, transfer and pump motors. All types of gasoline hose. Portable transmission and differential lube oil dispensers. New and improved equipment for bulk stations. New devices for speeding up free service with satisfaction to customer.

Tulsa members of the Explorations committee make plans for attendance of geologists. Seated are: W. B. Wilson, Gulf Oil Corp.; Mrs. Dollie Radler Hall, Amerada Petroleum Co., and standing are Luther H. White, Deep Rock Oil Co., chairman; and L. F. McCollum, Carter Oil Co.



Work progresses on the 50 per cent enlarged Exposition grounds. In the foreground is the new cafeteria building. The inset shows where the new exhibit buildings are being constructed.

VAST IMPROVEMENT TO INTERNATIONAL PETROLEUM EXPOSITION GROUNDS



Directors of the International Petroleum Exposition as they assembled to dedicate one of the two new exhibit buildings being constructed for the May 14 to 21 oil show at Tulsa.

Merle C. Clarke, assistant manager, inspects prize beeves which the Exposition has purchased to serve in the new Cafeteria building.

Interior of the new modernistic cafeteria, which will seat approximately 1,000 people. When finished, the building will be sound proofed to minimize noise from dishes and talking.

Heavy equipment at the last Exposition.

Among the displays featuring the four major divisions of the industry 402 COMPANIES WILL HAVE EXHIBITS ON DRILLING AND PRODUCTION. Advances in drilling, exploration and transportation of equipment. High pressure boilers, and super heaters. Vertical engines with separate drives for rotary tables. Economical use of steam. Circumferential field welding of casing. Water flooding. Re-pressuring. New stage method of acidizing. Squeeze cementing. Portable rotaries for core, wildcat, exploration and "slim hole" drilling to 4,000 feet. Heavier pumping equipment for deep wells. Packer which requires no anchor. Sub-surface pressure studies to gauge life of oil wells. Portable core laboratory service. Greater speed in coring in soft and hard formations, etc.

Workmen put in additional water and gas lines in preparation for the 50 per cent increased exhibits at the 1938 Exposition.

THE Petroleum Engineer

APRIL, 1938

Electric Field Pipe Line Station Operates Automatically

Self-priming unit embodies arrangement of equipment new in field gathering systems

By

FRANK H. LOVE

THE Caddo Station of the Magnolia Pipe Line Company in the Rodessa field, an automatic intermediate field station, embodies an arrangement of equipment new in field gathering systems.

Standard practice in handling crude at a field station that discharges into the main-line station is to employ a suction pump, usually a 10-in. by 18-in. reciprocating type, a working tank of 1000- to 5000-bbl. capacity, and a reciprocating or centrifugal discharge pump. Unless this standard practice is followed trouble occurs in stripping the field lines of the gathering system because of the accumulation of gas and air in the system ahead of the suction pump. In the past numerous field stations have been installed with a view to eliminating the suction pump and the working tank and pulling oil in from the field and discharging simultaneously, either with a reciprocating or centrifugal pump. One familiar with this procedure knows of the difficulties encountered.

SERVICE FOR SHOW VISITORS

As a service to International Petroleum Exposition visitors The Petroleum Engineer has arranged for a Postal Telegraph office in the lobby of its new building on Drake Drive near the 21st Street entrance where messages can be received and dispatched. Messages received will be delivered to exhibit booths throughout the Exposition grounds. Four local and long distance telephone booths, and an information and change counter also will be provided in the building.

The Petroleum Engineer will conduct the registration for the Show. Each visitor actively connected with the petroleum industry will be given a badge containing his name and company connection. The color of the badge will indicate the division of the industry with which he is identified. A part of the plan entails the giving of valuable awards to those registered.

In field systems, when the gauger is unable to make tank shutoffs at the proper time, air enters the lines, of course, and retards the flow of oil from other tank batteries. To make the field station operate entirely automatically, at the same time replacing the suction pump and working tank with smaller and different type equipment, the method illustrated diagrammatically in Fig. 1 has been incorporated by the Magnolia Pipe Line Company in its Caddo Station. The arrangement, which has been patented, can be used both with reciprocating and centrifugal pumps and in field stations or main-line stations. In reality, it is a self-priming unit.

It is well understood that a centrifugal pump has a specific work to perform in regard to its capacity and head. The self-priming tank, as shown in Fig. 1, is connected ahead of the centrifugal pump and is approximately 4 ft. in diameter by 6 ft. high. Inside the tank at the top is a ball float, attached to a lever, which operates a

Caddo Station of Magnolia Pipe Line Company

mercoid switch. There also is a low-level mercoid switch at a point near the bottom of the tank, which has its own ball float attached, and installed on the outside of the tank is a gauge glass that shows the level of oil inside the tank over nearly its entire length.

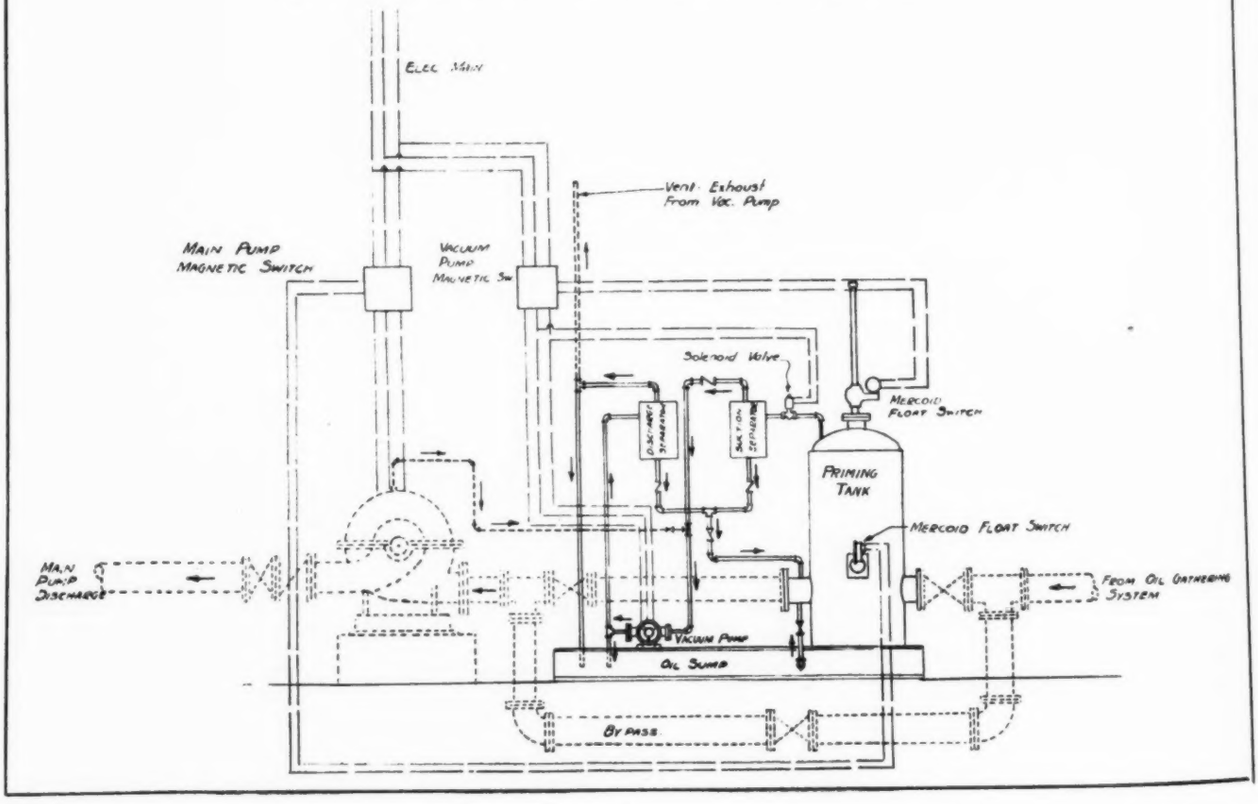
The wet-type vacuum pump (driven by a 5-hp. motor) used in this particular station has the same displacement of air as a 10-in. by 18-in. reciprocating-type suction pump. Because of its type it was necessary to install a sump under the base of the pump so that it can regenerate the crude oil, which creates the vacuum.

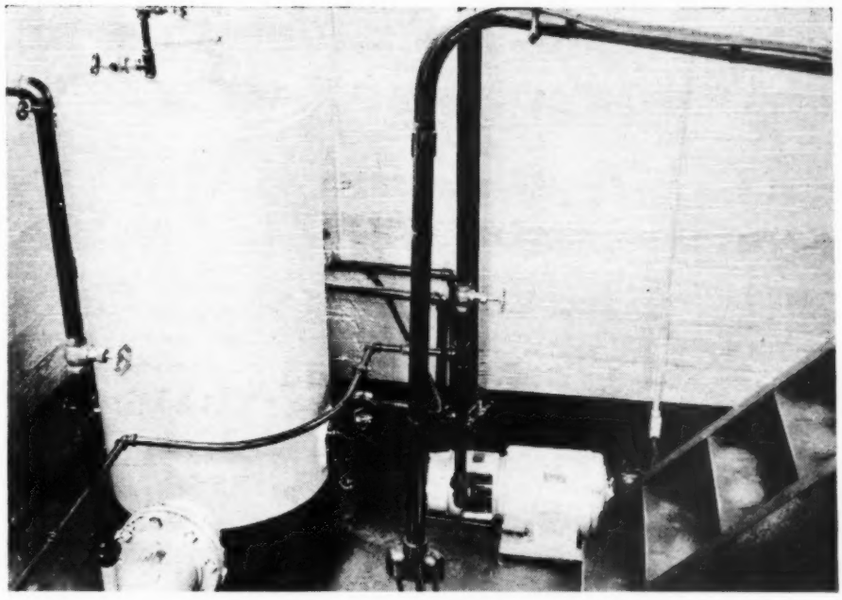
The line at the top of the priming tank, which is the suction to the vacuum pump, has an electrically-operated solenoid valve on it ahead of a small oil separator. There is also a small oil separator on the discharge line from the vacuum pump. The object of both separators is to separate oil from the gas or air that the vacuum pump may pull over.

The unit operates in the following manner:

When the field lines are loaded, in the morning for instance, the gauger opens the main valves at the station and starts the centrifugal pump. This pump will run uninterruptedly until the system is pulled down to such an extent that voids, due to gas or air entering the line, occur ahead of the station. When these occur the oil level in the priming tank drops to a point where the top mercoid switch, operated by the float, automatically starts the vacuum pump without the main centrifugal pump being shut down. The vacuum pump operates until the gas or air accumulated in the priming tank is expelled and the level of the oil in the priming tank rises and contacts the mercoid switch at the top of the tank, shutting off the motor operating the vacuum pump. It should be

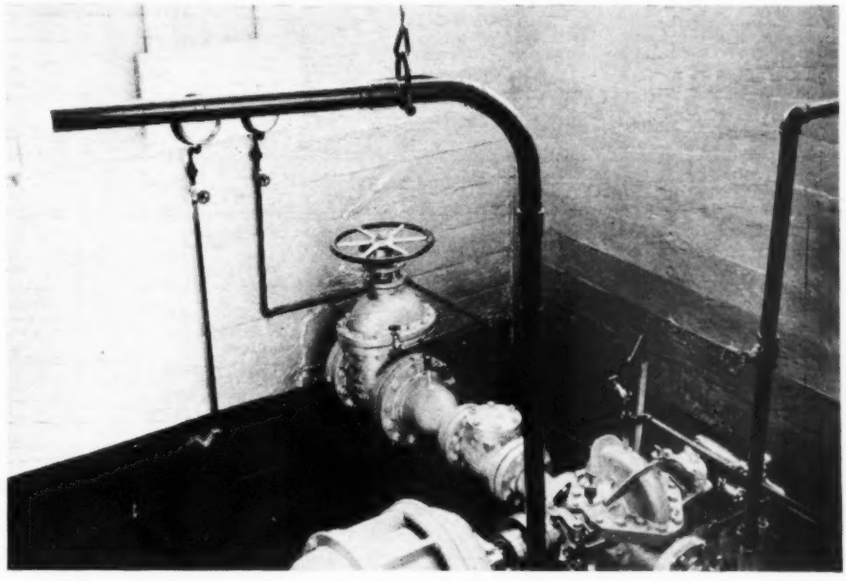
Fig. 1. Diagrammatic sketch of automatic suction primer installation





At the left of the illustration is shown the priming tank. On the floor at the right is the vacuum pump

noted that when the mercoid switch starts the motor that drives the vacuum pump the electrically-operated solenoid valve opens automatically, and also closes automatically when the same mercoid switch shuts off the motor. This operation is continued until the field lines are stripped of oil or until the station is shut down by the gauger. The lower mercoid switch on the priming tank, which is separately float-operated, is used only to protect the main centrifugal pump by shutting it down in event the crude oil is entirely pumped out ahead of the station. This pump, however, will again



The centrifugal discharge pump driven by a 60-hp. motor

start operating when oil entering the priming tank raises the float attached to the lower mercoid switch, which in turn electrically starts the pump.

The station's discharge pump is a 4-in. centrifugal unit driven by a 60-hp., 2200-volt, 3-phase, 60-cycle motor, using purchased power. The capacity of the pump is 23,000 bbl. per day against 100-lb. discharge pressure. The vacuum pump is a monobloc unit.

J. G. Norton, assistant superintendent of maintenance of the Magnolia

Rodessa Station of Magnolia Pipe Line Company. It is to this station that the Caddo Station pumps. The former is equipped with three reciprocating pumps having a total capacity of 29,300 bbl. per day. The pumps are driven by one 200-hp. and two 150-hp. motors

Pipe Line Company, is the designer of the pumping arrangement described here. A. M. Lockett and Company, Dallas, Texas, are distributors for the priming equipment and owners of the patents.

Application of Electrical Logging Methods to West Texas Problems*

Part 1

By

W. J. GILLINGHAM and W. B. STEWARD†

Introduction

ELECTRICAL logging has now become such a well established and normal technique in oilfield exploitation that numerous papers have been written describing its application to oilfield problems in the Gulf Coast, California, and Venezuela. Practically nothing, however, has been written describing its applications in West Texas.

It is the object of this paper, therefore, to outline the work in West Texas by describing:

(1) The application of electrical logging with special regard to correlations.

(2) The application of temperature measurements to the determination of the gas and oil horizons in drilling and producing wells.

(3) The determination of the source of waterflows in producing wells by means of the Dale photoelectric instrument.

*Presented at the Spring Meeting of the Mid-Continent District, A.P.I. Division of Production, Herring Hotel, Amarillo, Texas, February 17-18, 1938.

†Schlumberger Well Surveying Corporation, Midland, Texas.

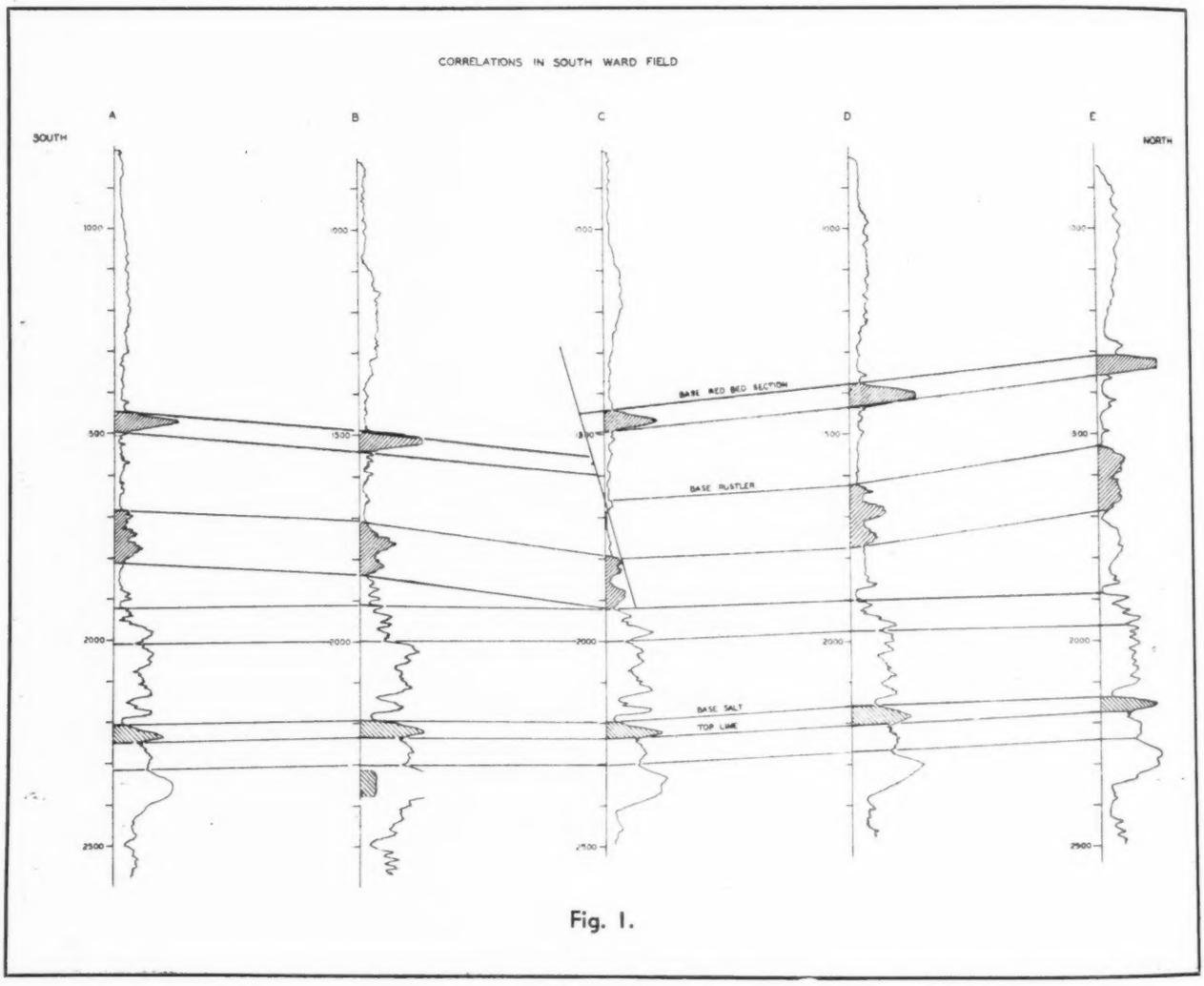


Fig. 1.

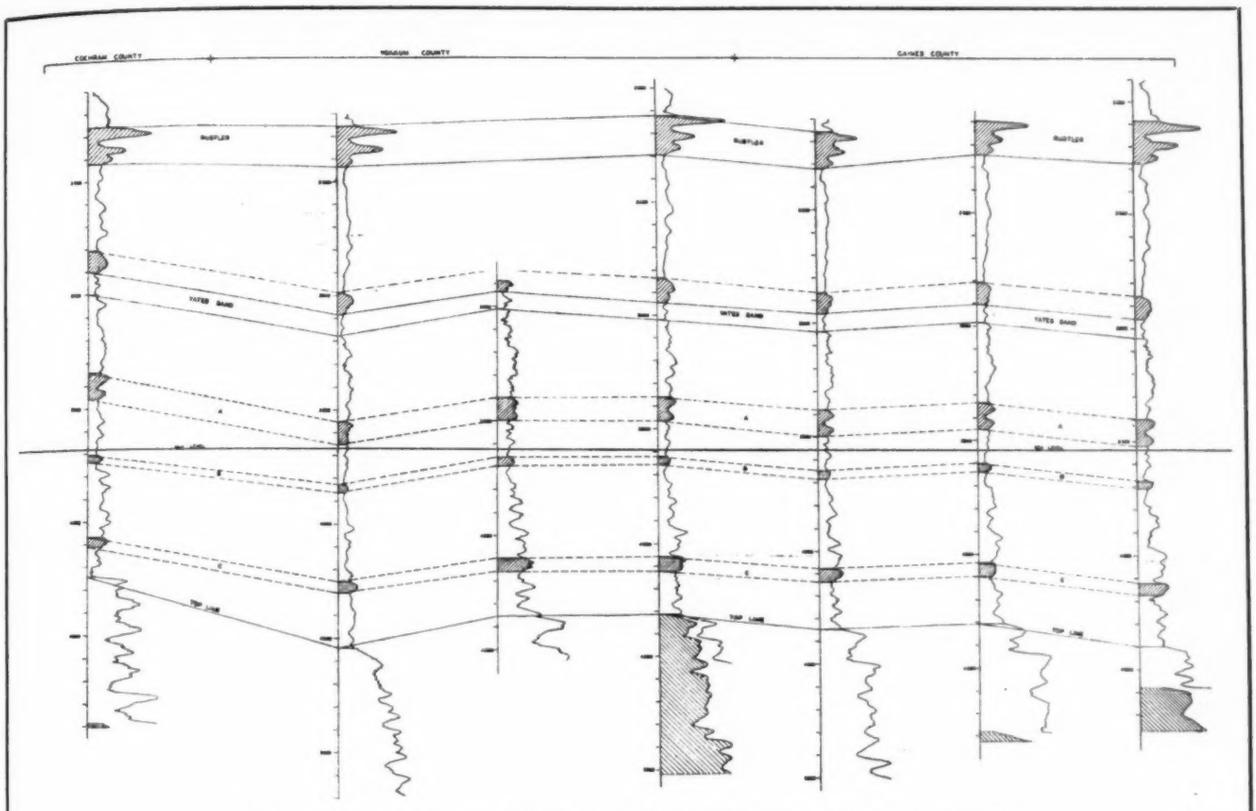


Fig. 2. Long distance correlations in Cochran, Yoakum, and Gaines counties

Electrical Logging

The theory of electrical logging has been so fully described in publications of this and other societies, that no detailed description[1] will be given here. The actual operation consists of lowering into the well at the end of an insulated cable a special electrode device, by means of which the resistivity and

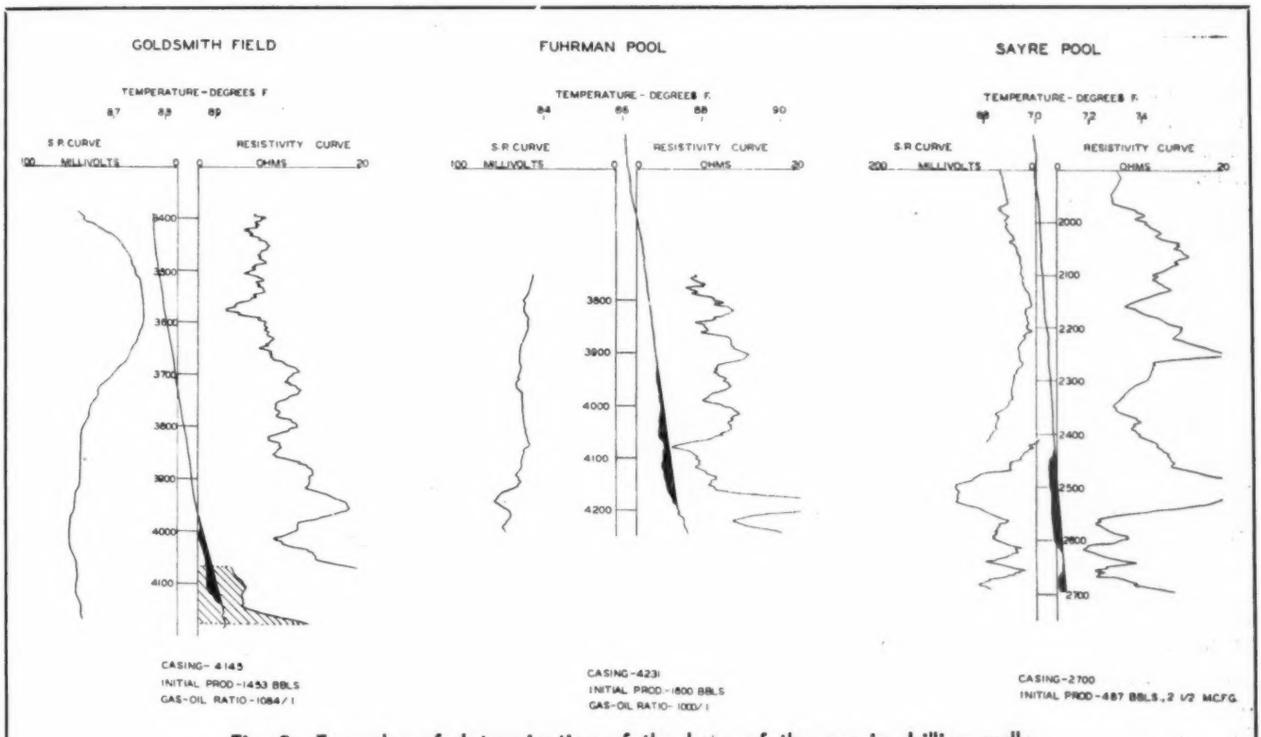


Fig. 3. Examples of determination of the base of the gas in drilling wells

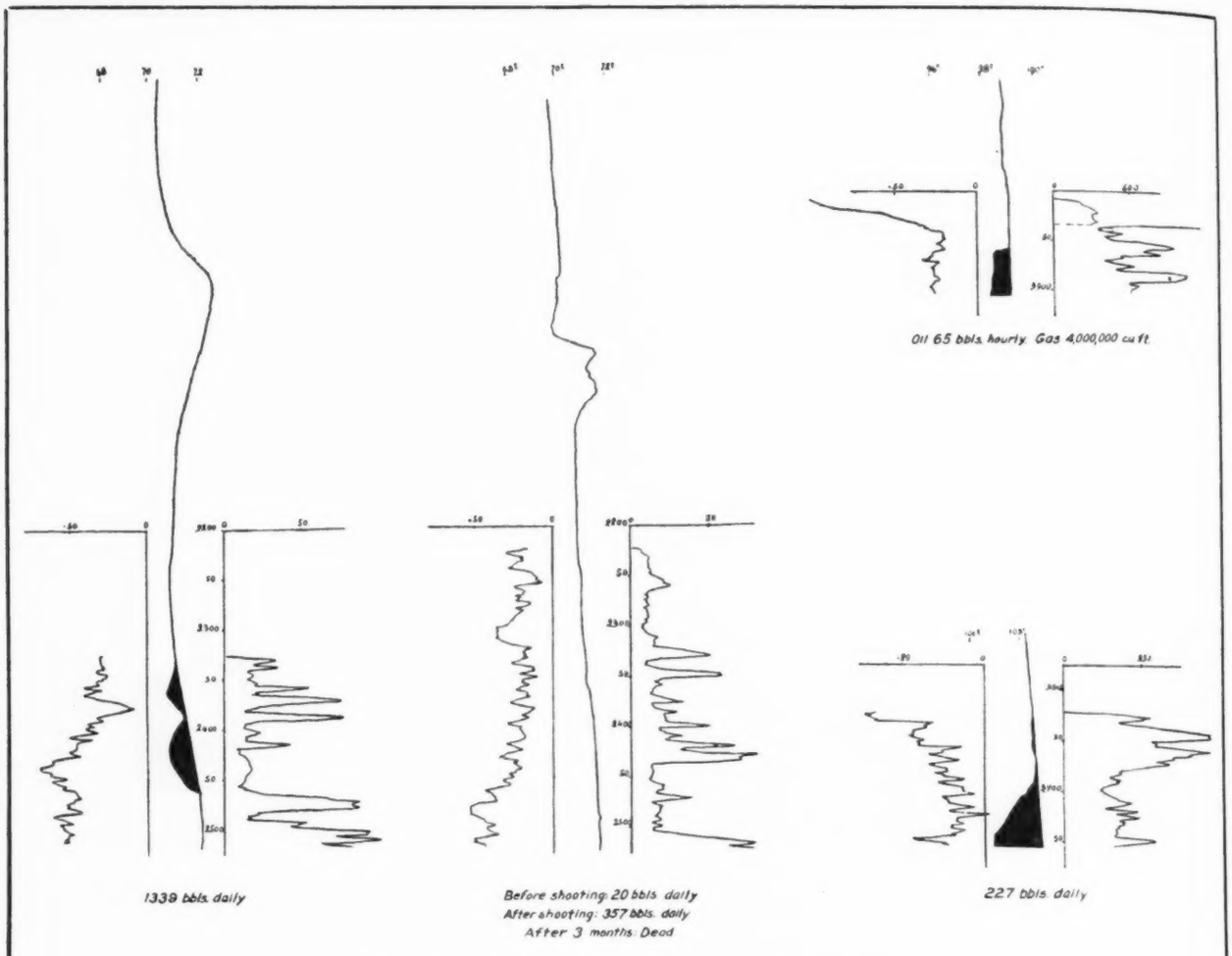

Oil 65 bbls. hourly Gas 4,000,000 cu ft.
1338 bbls. daily
Before shooting: 20 bbls. daily
After shooting: 357 bbls. daily
After 3 months: Dead
227 bbls. daily

Fig. 4. Location of oil pays by temperature surveys

self-potential of the formations in the hole can be measured. Since each type of formation has its own relative value of resistivity and every particular zone its pattern, the resulting log affords an easy and accurate means of distinguishing between the different formations. It is obvious, therefore, that the electrical log should offer an excellent means of correlation.

Correlation

The excellent correlations that can be obtained with the electrical logs in sand and shale formations, such as in the Gulf Coast, have already been described.[2,3] Equally good correlation can be obtained in West Texas with the resistivity curve, and in spite of the gradational nature of the sediments can be carried over considerable distances.

Most geologists will agree that rotary samples are a poor substitute for a cable-tool log on account of the errors introduced by time lag, cavings, etc. An electrical log, on the other hand, will differentiate between the different formations encountered even more accurately than a cable-tool log and without the personal element entering into the resulting log.

Fig. 1 shows the detailed correlation possible in a section of the South Ward field. The section below the base of the salt is seen to run quite normally through all wells. A certain variation is noticeable in the salt section, however, and especially in the well C. These irregularities are readily explained by the erosion of the salt at 1900 ft. with consequent subsidence and faulting, hence giving rise to repetition of part of the Rustler Formation.

Fig. 2 shows that correlation is still possible over quite considerable distances; it represents an approximate north-south section through Cochran, Yoakum, and Gaines counties, a total distance of over 50 miles. It is to be noted that all the well-known geological markers, Rustler, Base of Salt, Yates Sand, Top of Lime, can be determined with ease from the electrical log. In addition to these markers, the numerous excellent electrical markers such as a, b, c, which cannot be picked from sample logs, are clearly shown up by the electrical log.

Determination of Porous Zones

As is customary in other districts electrical logging measurements of self-potential, heretofore called electrical porosity, are made at the same time as the resistivity curve. The self-potential, or S. P. curve, results from two major phenomena, electrofiltration and electrochemical action. Electrofiltration is inversely proportional to the salinity of the mud. Since in this district the muds usually employed are saturated with salt, the self-potential anomalies due to electrofiltration are very small and hence completely masked by the electrochemical effects. As a result the determination of the porosity or permeability is extremely difficult and sometimes impossible elec-

trically; however, if a fresh mud is employed, as is usually the case in work-over jobs, the S. P. curve will show quite clearly the porous and non-porous zones. Consequently, taken in conjunction with the resistivity curve, it will serve to pick out the impermeable lime breaks which will act as the best packer seat, after the base of the gas has been determined from the temperature survey, which is described hereafter.

Temperature Measurements

It has long been realized that the parameter of temperature could be of great value, if it could be accurately and practically measured. Bottom-hole measurements, of course, have long been taken and have given extremely interesting information. Until recently, however, practical difficulties prevented the development of an instrument capable of withstanding the extremely high pressures encountered in drilling, and yet capable of giving a continuous, accurate, and rapid measurement of the temperature in a drill hole.

In the last few years an electrical-resistance thermometer has been developed, which records to an accuracy of 0.2 deg. fahr. and has a time constant such that a continuous log can be made at the rate of 2000 ft. per hour. This thermometer is lowered into the well at the end of the insulated cable used for electrical logging and all measurements are made at the surface. With this instrument systematic temperature surveys were started in West Texas in 1935; since then several hundred temperature surveys have been run on wells situated in all parts of the Permain basin and have demonstrated the great value of temperature measurements in oilfield operation.

Applications

The possibility of logging formations behind casing and determining the top of the cement by temperature measurements has been described in previous publications.[4] In West Texas, however, it was found that continuous temperature measurements would detect and outline very clearly the gas and oil-bearing formations, and it is for this purpose that temperature measurements are generally employed in West Texas today.

It is a well known physical effect, utilized in modern refrigeration, that an expanding gas gives rise to a cooling effect. A formation which has recently produced gas for any length of time, therefore, will be at a lower temperature than the surrounding unproductive formations. It is quite easy, therefore, to detect the gas-producing formations in producing wells or wells which have recently been on production. It has been found that this technique can be equally well applied to drilling wells, although the reasons for this success have not been completely explained. Consequently, gas-bearing formations show on the temperature log in both drilling and producing wells by a distinctly cool anomaly.

Oil pays will also show a cool anomaly, on account of the gas they contain in solution which will show, as described above, a cool anomaly on the temperature log. However, the cooling effect generated by the gas in solution is usually much less than that generated by free gas, and as a result it is usually easy to distinguish between the two, where both are present.

DRILLING WELLS—A Determination of the Base of the Gas

One of the most difficult and important problems in the Permian Basin is the location of the base of the gas so that casing may be set correctly. If the casing is set too low, valuable oil pay may be cased off; on the other hand, if the casing is set too high, a well with a high gas-oil ratio, or even a practically dry gas well may result.

It has already been explained how a temperature curve made after a sufficient circulation will show up the gas-bearing horizons. Fig. 3 shows examples from the Goldsmith, Furhman, and Sayre pools. The example from the Furhman pool is exceptionally interesting since the offset well to the one surveyed made over 10,000,000 cu. ft. of gas with casing set at 4050 feet. On setting a liner to 4205 ft. the gas was eliminated and the well brought in with a low gas-oil ratio. The example in the Sayre pool, on the other hand, shows the disadvantage of setting casing before the base of the gas has been reached, a well with a high gas-oil ratio resulting.

To obtain the best temperature results the well should be circulated from bottom for at least two hours. This serves the dual purpose of cleaning the hole and removing any thermal anomalies which might be generated by drilling. The mud used should also be sufficiently heavy so that no gas can be seen bubbling through it; if the latter state should occur the bubbling gas cools the entire fluid column as it expands up the hole and it is impossible to locate the source of gas accurately.

Location of Oil Pays

Oil pays, as has been previously explained, also give a cool anomaly on the temperature curve, except that the anomaly is much less pronounced than that due to gas under similar conditions of mud weight and time of circulation. However, if a light mud is employed and the temperature survey is made several hours after circulation, quite distinct anomalies will result. Fig. 4 shows several examples of the location of oil pays by temperature measurements. The second example is extremely interesting since no cooling effect was apparent even though several runs were made. This well produced for only three months before going dead. It must be emphasized that the degree of cooling is not proportional to the potential production of the well, since it is impossible to allow for such factors as weight, viscosity of mud, time after circulation, etc.

EDITOR'S NOTE: *This article will be concluded next month.*

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[1]C. and M. Schlumberger and E. G. Leonardon, "Electrical Coring; A Method of Determining Bottom-Hole Data by Electrical Measurements." Trans. A.I.M.E. Vol. 110, p. 237.

[2]Alexander Deussen and Eugene G. Leonardon, "Use of Electrical Logs for Correlation in Gulf Coast of Texas and Louisiana." A.P.I. Meeting, Los Angeles, California, November 14, 1935.

[3]E. W. K. Andrau, "Schlumberger Correlations and Tectonic Problems on Gulf Coast Salt Domes." A.A.P.G. Meeting, Wichita, Kansas, March 21-23, 1935.

[4]E. G. Lecnardon, "The Economic Utility of Thermometric Measurements in Drill Holes in Connection with Drilling and Cementing Problems." Bull. Soc. Pet. Geophysicists, Vol. 1, January, 1936.

THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending Exposition. Register immediately on arrival.

Interesting Program Pre
Western Petroleum Refiners A

THE program for the general sessions at the 26th annual meeting of the Western Petroleum Refiners Association at Hot Springs, Arkansas, April 25, 26, and 27, has been announced by A. V. Bourque, secretary-treasurer.

Five men, nationally known in the business, industrial, and professional world, will speak Tuesday afternoon and Wednesday morning at the general sessions, which will follow the technical program arranged by the manufacturing committee of the association.

The five nationally-known speakers, Bourque says, include B. C. Forbes, writer and commentator on business subjects; Glenn Griswold, vice-president, McGraw-Hill Publications and an economist and analyst of business conditions; Whiting Williams, industrial relations counsel of international experience; and Harvey T. Harrison, attorney of Little Rock, Arkansas, widely known as a speaker on legal and national affairs.

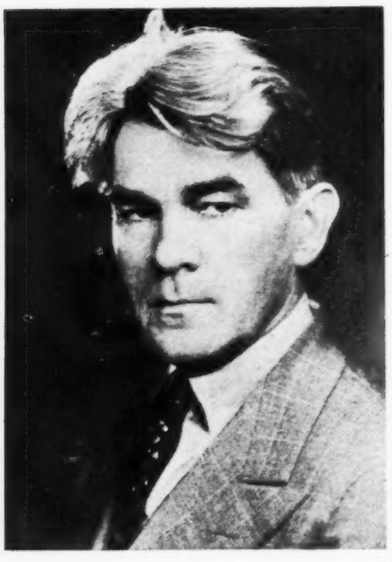
The fifth speaker on the general program will be James R. Adams, of the advertising firm of McManus, John and Adams, Detroit. Adams is an advertising and marketing consultant and the author of "More Power To Advertising" a layman's discussion of advertising, which in many cities is among the non-fiction best sellers. Adams for a number of years has directed the advertising of motor cars and allied lines.

Forbes, a native of Scotland, has been observer of American business since 1904 when he started his American career as a New York financial writer. He is now editor of *Forbes Magazine* and conducts a syndicated newspaper column on business and business men. Because of his facility in writing of big business in simple, human terms, he has been called the "humanizer of big business." The title of his address, "America's Future Brightness," indicates his optimistic attitude toward business generally.

Griswold, editorial director of the McGraw-Hill group of business publications, is in close contact with the men and events that influence business conditions in America. He will speak

B. C. FORBES

HARVEY T. HARRISON



FRANK PRAEGER

GLENN GRISWOLD

pared for Meeting of Association • Hot Springs, Arkansas, April 25, 26, and 27

on present economic and political trends.

Williams, whose knowledge of labor has been gained through actual work in mines, factories, and industrial plants, as well as from the desk of the executive in American and foreign countries, will discuss labor relations from the refiner's point of view. His subject will be "This Day Our Daily Job."

Harrison, Little Rock attorney, is an entertaining speaker who sees and comments upon the amusing phases of America's serious business and legal problems. Although the title of his address has not been announced he will speak on the relation between business and government.

The technical sessions of the program, which will occupy the first afternoon and the second morning, have been arranged to interest the workers in plants seeking the most advanced information on technical and mechanical improvements in refining processes, as well as executives who must look at the economics of each process.

The four papers on technical problems will be delivered by men high in their profession and widely experienced in their respective fields. The technical program:

"True Vapor Phase Process" by Frank Praeger, Alcorn Combustion Company, Philadelphia, Pennsylvania.

"The Pawhuska Road Tests" by W. W. Scheumann, Cities Service Oil Company, Tulsa, Oklahoma.

"Combination Units Versus Cracking and Topping" by Dr. E. R. Smoley, The Lummus Company, New York, New York.

"Water Treating For Prevention of Scale, Corrosion, and Organic Growths," L. D. Betz of W. H. & L. D. Betz, Philadelphia.

As in past meetings of the Western Petroleum Refiners Association the papers will be followed by lively discussion from the floor.

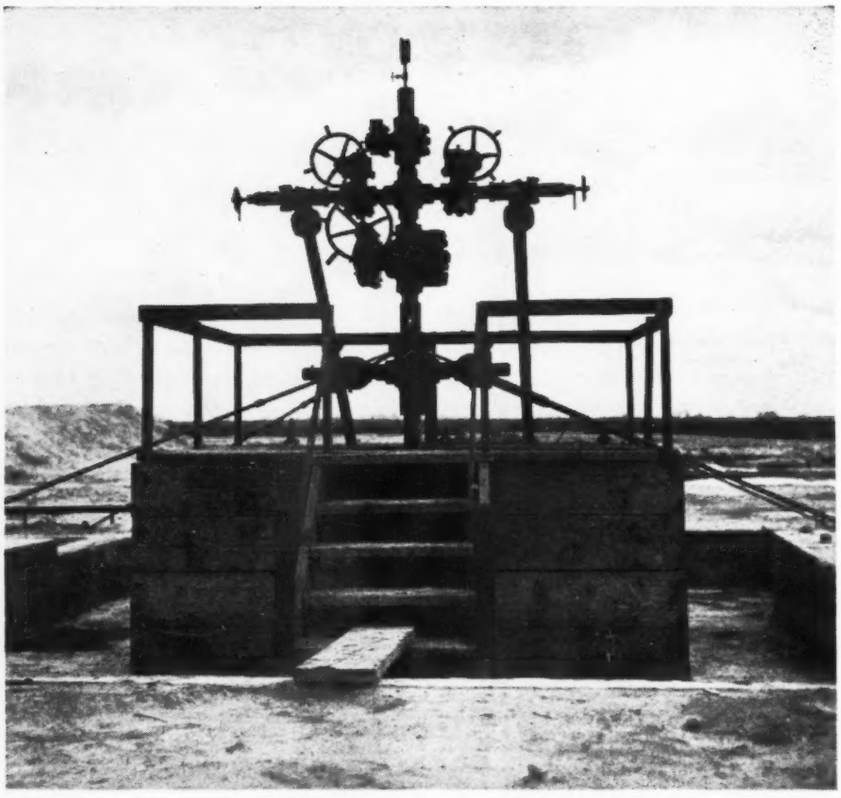
Attendance at this year's meeting, celebrating the 26th anniversary of the refiners' organization, promises to be as great as or even greater than that at the record-breaking meeting at Hot Springs last year when the quarter-century anniversary was celebrated.

WHITING WILLIAMS

W. W. SCHEUMANN

DR. E. R. SMOLEY

L. D. BETZ



The first well drilled by Continental Oil Company, just west of Wasco, California, and from which the derrick and rig were moved to drill the world's deepest well. This well was drilled to a depth of 9591 ft. where it struck a high-pressure, but small-volume oil-bearing shale. A twist-off here occurred and a length of 4-in. drill pipe was left in the hole. A string of 2¾-in., 4.8-lb. external flush joint drill pipe was run in through the 4-in. drill pipe and the 2⅜-in. hole in the rock bit with which the well was being drilled was reamed out to 2⅝ in. and the well cleaned to bottom. A production hook-up as shown in the picture was made and the well has flowed seven bbl. of oil per day since, producing through the bit and the drill pipe.

By

Wallace A. Sawdon

Petroleum Engineer,
Los Angeles, California

New World's Drilling and Producing Depth Records Established in California

Drilled to 15,004 ft., Continental Oil Company's No. A-2 K. C. L. provided an opportunity to prove the adaptability of sub-surface equipment and instruments at depths never before penetrated. Cementing of a liner in two stages at a depth of 14,461 ft. was an outstanding engineering operation

AFTER being drilled to a record depth of 15,004 ft., Continental Oil Company's well No. A-2 K.C.L., five miles west of Wasco, California, was electrically logged to determine which of the formations offered the best prospects for production. On the basis of the data thus obtained a zone just below 13,000 ft. was tested April 12. Initial production was 591 bbl. in 24 hours through a ¼-in. bean. The casing pressure was 400 lb. and the tubing pressure 1350 lb., and 250,000 cu. ft. of gas accompanied the oil. On a one-hour test through ¾-in. choke the well flowed at the rate of 3000 bbl. of oil and 660,000 cu. ft. of gas per day with a pressure of 50 lb. on the casing and 400 lb. on the tubing. The fluid was 37.1-deg. A.P.I. oil cutting five percent mud and two percent water. The content of water and mud declined to five percent during the day's test. Tankage was not available for gauging actual production at the time of completion and the large flow of gas could not be metered because of lack of facilities.

Although the well was not productive at the record drilling depth of 15,004 ft., it nevertheless set a production depth record, as the producing zone is nearly 2000 ft. deeper than that of the previous deepest commercial producer, Union Oil Company's well No. 1-34 K.C.L. in the Rio Bravo field 14 miles to the southeast.

A general description of the equipment used and the operation to a depth just below 13,000 ft. was given in the February issue of *The Petroleum Engineer*. Only one fishing job of any importance occurred during the drilling of the well. This was caused by the 101-lb.-per-cu.-ft. mud causing the 9⅝-in. bit to stick when it had drilled three ft. into a massive sand body encountered at 11,581 feet.

Rotating speed during drilling probably averaged a little more than 100 r.p.m., but no tachometer was used to provide definite information. The weight carried on the bit varied somewhat in drilling different formations. Controlled vertical drilling was practiced throughout and inclination readings were taken at frequent intervals. A complete survey[1] made at 11,700 ft. showed the bottom at that depth to be at a horizontal distance of only 21 ft. from the surface location. Although no complete surveys were made of the hole below the depth of 11,700 ft.,

[1]This survey was made by a gyroscopic well-surveying instrument lowered on a wire line, and not as mentioned on page 43 of the February issue of *The Petroleum Engineer*, which applies to a survey by means of orienting the drill pipe.

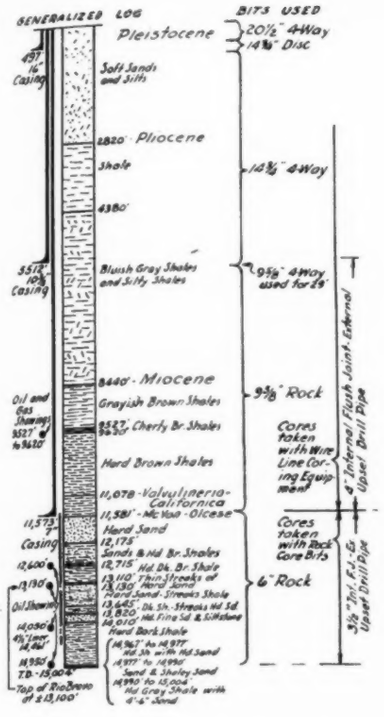


Fig. 1. Showing formations, casing, and liner, as well as type of bits used in drilling and coring the world's deepest well

inclination readings were taken to 14,800 ft., where the angle from vertical was only 2¼ degrees.

Drilling Bits

The speed made by the various drilling bits to the depth of 11,584 ft. where the fishing job occurred is given in Table 1. The depths drilled by each type bit and the character of formation penetrated are shown in Fig. 1.

In considering the performance of the various bits it must be noted that heaving shales were penetrated while drilling the 14¾-in. hole, although the difficulties encountered in passing through this formation were largely overcome by the use of sodium silicate in the mud. In drilling the 9⅝-in. hole, the last 2000 ft. were drilled after passing through high-pressure oil and gas zones and using mud weighing 101 lb. per cu. foot.

After the 7-in. casing was cemented, a formation tester was used to make a water-shut-off test. This stuck and in fishing it out one special type bit and two junk traps were used and cut 15 ft. of hole. From this point rock bits were employed for all straight drilling and made consistent drilling progress at an average rate between 3 and 3.5 ft. per hour.

The average footage made per bit cannot be presented fairly unless more than one bit of a certain type is used. To credit a bit with only the footage made by one run when it might not have been worn sufficiently to require changing would give an erroneous impression; the following tabulation, therefore, includes only the footage of those types of bits of which more than one were used.

10	14¾-in. 4-Way	476.7 av. ft. per bit
4	9⅝-in. Rock	343.7 av. ft. per bit
6	9⅝-in. Rock	176.9 av. ft. per bit
29	9⅝-in. Rock	95.6 av. ft. per bit

The circulating fluid used below the 7-in. casing and while drilling 6-in. hole weighed less than 70 lb. per cu. ft. and at the greatest depths was sometimes not much heavier than water. The circulating fluid was a mixture of water and colloidal admixture only, except for what little mud was made in drilling the hole.

In drilling the 6-in. hole the rock bits drilled an average distance of more than 40 ft. per bit. As shown in Fig. 1, formations drilled consisted of hard shales and hard sands. At a depth just above 14,000 ft. a cone was lost, but after a brief but unsuccessful attempt to fish it out drilling was continued and hole made without any difficulty.

Coring and Logging

Coring in the 9⅝-in. hole was done with wire-line coring equipment. In the upper formations, two soft formation core heads were used to take 28 cores having a total length of 289 feet. The recovery was 262 ft., a recovery percentage of 90.6.

In the formations between 9500 ft. and 11,584 ft. 14 hard formation core heads took 67 cores having a total length of 554 feet. The recovery was 341 ft. and the recovery percentage 61.5.

When drilling the 6-in. hole below the 7-in. casing a safety joint having an internal diameter of 1⅞ in. was placed in the drill stem. This was too small to permit use of retractable coring equipment, so cores were taken with conventional core barrels thereafter.

Hard formation core bits were used with the 6-in. core barrels and cores

Fig. 2. The 4½-in. liner was cemented in two stages, using the equipment here shown

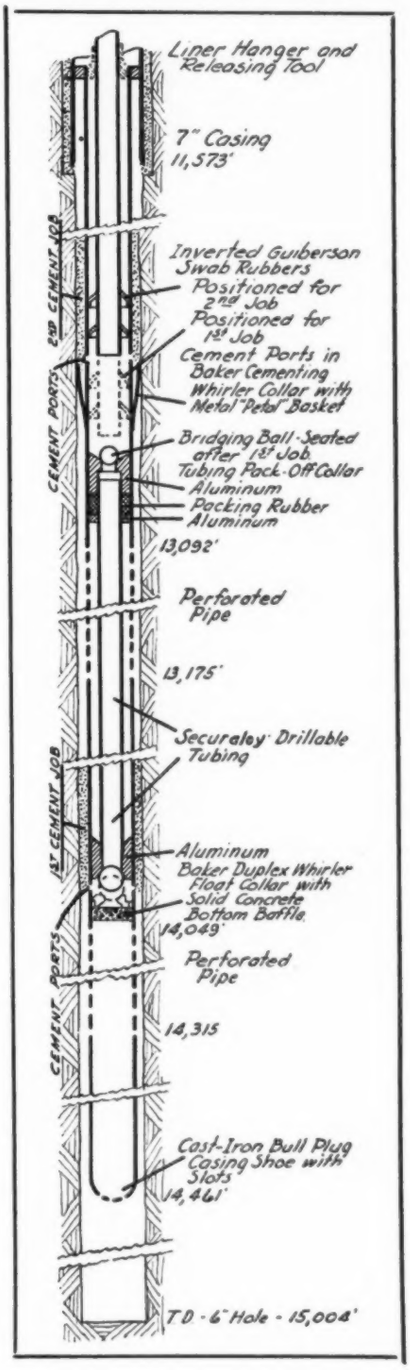


TABLE 1

Bits Used From Surface to 11,584 Feet

Type	Size	No. used	Total footage	Total hours	Drlg. speed, ft. per hr.
4-way	20½	1	497	10	49.7
Disc	14¾	1	221	4	55.3
4-way	14¾	10	4787	200	23.9
4-way	9⅝	1	29	4	7.3
Rock	9⅝	4	1375	100	13.75
Rock	9⅝	6	1061	202	5.3
Rock	9⅝	29	2771	904	3.1

were generally taken after each run of the rock drilling bit. Frequently, however, conditions would indicate the desirability of taking additional cores to procure further data, and the entire distance from 14,977 ft. to the final depth of 15,004 ft. was cored. Core recovery was high at all depths, the average being 78.7 percent for the first 35 runs taken in the 6-in. hole. This percentage was exceeded in the hard formations at the lowest depths.

Porosity tests were made of all sand cores and paleontological analyses made of cores taken at depths where definite identification was thought necessary. The top of the Rio Bravo at a depth of approximately 13,100 ft. was the top of a sandy series. A slight showing of oil was logged at 12,600 ft. and a more important one at 13,130 ft., just below the top of the sandy zone. Strong showings of oil and gas were noticed in the ditch while drilling at depths of 14,050 ft. and 14,950 feet.

The value of electrical logging was clearly emphasized in this well. Cores had provided valuable data during drilling but it was only after drilling had stopped and an electrical log was made to the total depth of 15,004 ft. that a decision was made regarding which zones to test. This log showed about 50 ft. of high porosity and high resistivity at 13,100 ft. and because the high resistivity should indicate oil in this area, in which no fresh water is to be expected, the probability of oil saturation in the porous stratum looked promising. Another zone that indicated possibilities was that at a depth of 14,050 ft. where showings had been noticed during drilling. This did not look so promising as the 13,100-ft. depth but plans were made to place perforations opposite each of these zones in the liner that was then set in the hole.

An Outstanding Cementing Job

The mere act of cementing a well at a depth below 14,000 ft. is worthy of attention. The cementing operation was performed at unprecedented depth, in exceptionally high temperature, and in two stages around a liner that was hung in casing the shoe of which was more than 500 ft. off bottom. The hookup designed to meet the conditions is shown diagrammatically in Fig. 2.

The effect of high temperature on both the cement and the equipment had to be considered. A temperature survey was earlier attempted but only an estimate of 280 deg. fahr. could be made at some distance above bottom. Whether the actual temperature encountered is greater than that can only be assumed. The bottom-hole temperature in the Union discovery well at Rio Bravo was found to be 247 deg. fahr. at 11,200 ft. and the temperature at Belridge is 240 deg. fahr. at 9000 feet. The temperature gradient in the San Joaquin Valley is known to be less than in some of the other California fields but at the great depth of the Continental well it is reasonable to assume that it is as high as the degree estimated.

In Fig. 2 the 2898-ft. string of 4½-in. O. D. liner and the equipment used for cementing it in two stages are shown as they were immediately after the second or upper stage cementing job was finished. The dotted lines indicate the position of certain elements during the first stage. The liner was perforated at the depths designated and cement was forced upward behind the sections of blank liner above these perforated sections.

The liner was made up and run in the hole to a point where the tubing pack-off collar was to be placed. This tubing pack-off collar consisted of an aluminum bottom blank, a rubber packing ring, and an aluminum packing gland at the top. The gland was used to tighten the rubber packing and still allow sufficient room for the expansion of the drillable tubing that extended downward from the pack-off collar to the whirler float collar below. The lengthwise expansion of the tubing was approximately 12 in. more than that of the liner.

After the tubing pack-off collar had been made up, the drillable tubing was run in and screwed into the upper end of the duplex cementing collar with right-hand coarse Acme threads. The packing assembly was then placed in position and tightly packed-off around the tubing. The rest of the liner was made-up on a J-tool threaded on the bottom to receive the upper assembly, which incorporated two inverted swab rubbers. Made-up in the liner above the pack-off collar was a cementing basket and above this a cementing whirler collar having valves on the periphery. The full liner assembly was then run into the hole to a depth of 14,461 ft. on 3½-in. O. D. external flush drill pipe.

The first or lower stage cement job was done by forcing 55 sacks of high-temperature cement down through the drill pipe, J-tool, and tubing and out through the ports in the duplex cementing collar at a depth of 13,996 feet. Passage of the cement through the ports in the whirler collar above was prevented by the swab rubbers; and return of the cement up the tubing was prevented by the ball back-pressure valve in the lower cementing collar.

As soon as the cement had been placed the bridging ball was dropped down the drill pipe and seated as shown in Fig. 2. The drill pipe, J-tool, and swab assembly were then raised above the ports in the whirler collar as indicated by the solid lines in the drawing. The second or upper stage cementing job was then done by forcing 130 sacks of high-temperature cement down the drill pipe and through the ports in the whirler collar at a depth of 13,005 feet. Both cementing jobs required a final pressure of 1950 pounds.

A slipping type shear joint was placed above the right-hand Acme threads in the lower cementing collar and this enabled the operator to remove the drillable tubing by means of a spear instead of drilling it up after cleaning out the upper job. As production was obtained from the 13,000-ft. zone, the lower collar has not been drilled out and will remain with its baffle in the liner unless tests for production through the lower perforated section are made at a later date.

Conclusion

Great credit is due the management, technical staff, and personnel for the completion of this well. When drilling began medium-weight and mostly old equipment was used because the original intention was to drill less than 10,000 ft.; but heavier and more modern surface equipment was adopted as it became needed and full advantage taken of the most modern and scientific methods for procuring data by which the desired results could be achieved and problems that arose successfully overcome. The judgment and intelligence exercised in drilling and completing this well has resulted in a definite contribution to the advancement of the industry.

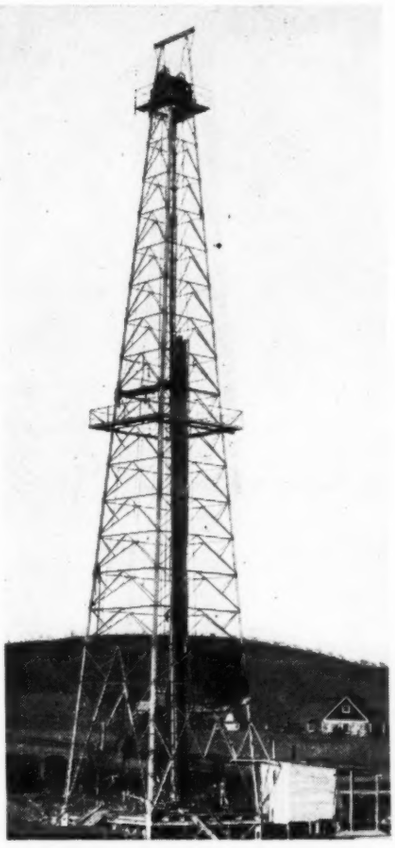
Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

Rotary Invades Southwestern Pennsylvania

By F. H. LINDSEY

THE southwestern part of the Keystone State, land of gentle mountain plateaus and winding trout streams, not far from the birthplace of the oil industry and cable tools, has finally been invaded by that whirling dervish, the rotary; nor would the appearance of the largest battleship among the sampans on a Chinese river create more interest among the boat dwellers than the massive rotary has among the rural inhabitants of Westmoreland County, Pennsylvania.

The instant the drilling contractor started to move equipment to the location, the drilling site became a veritable arena, in which the tractors, trucks, block and tackle, gin poles, rotary table, etc., were the roaring wild beasts matched with the skill and brawn of the rig builders. The fascinated audience lined the banks or wandered over the site, unaware of the knee-deep mud through which they plowed, examining minutely and exclaiming over each piece of equipment as it was moved onto the location. The personable Fred Koskie and his crew of fellow Texans and Oklahomans worked diligently directing the erection of the equipment, but because of the fact that proper hauling equipment and labor familiar with this type of erection were not readily available, some time was lost in the completion of the rig. Further delays were also caused when suitable drilling bits could not be obtained on short notice, but despite all the aggravating delays in getting the rotary started, the surface drainage has finally been cased off with 410 ft. of 13⅜-in. casing, the blowout preventers installed, and the well drilled to a depth of 1450 ft. at the present writing.



The first rotary rig ever to be used in southwestern Pennsylvania

The well is being drilled for the Peoples Natural Gas Company of Pittsburgh, by Loffland Brothers, drilling contractors, on the John S. Marshall farm in Penn Township. A National unitized rotary drawworks and rotary table, National crown block and traveling block are being used. This outfit is powered by two 300-hp. Waukesha gas engines hooked up in tandem and mounted on a unitized set of engine skids. The derrick is a Lee C. Moore 136-ft. K-type, mounted on a 1,000,000-lb. capacity, 26-ft. base substructure.

The well is visited daily by hundreds of sightseers, many of whom are old cable-tool drillers, tool dressers, and roustabouts from this and neighboring vicinities. The all-day-Saturday-and-Sunday visitors who have neglected to pack a picnic lunch are now being courteously served by a portable lunch wagon erected on the property adjoining the lease. Many of the questions asked are foolish and absurd, but our grandchildren should know all the correct answers, if rotary drilling proves successful and economical in this part of Pennsylvania.

Disposal of Petroleum Wastes on Oil-Producing Properties

THE disposal of petroleum wastes on oil-producing properties, an operating problem of considerable importance in many producing areas, is discussed in a report published by the U. S. Bureau of Mines. Petroleum wastes include emulsions of petroleum and water or mixtures of petroleum and sand that cannot be "broken down" or treated economically by known methods of separating petroleum from deleterious matter; crude petroleum that escapes from pipe lines, fittings, or tanks, due either to holes in the line, leaky connections, or the result of some accident; and oil-saturated materials that accumulate accidentally or otherwise in the normal operation of an oil-producing property.

The efficient operation of oil-producing properties, including satisfactory methods of disposal of oilfield wastes, prevents the injurious effects of petroleum wastes on soil, vegetation, aquatic and wild life, and live stock, state the authors, Ludwig Schmidt and C. J. Wilhelm. On many properties the problem of disposal is aggravated by the necessity of separating the brine produced with the crude petroleum and the breaking down of oil and water emulsions. Modern equipment and practices for the separation of water and other deleterious substances from the oil are described and illustrated. Recommendations are included for the design of oil-water separators where the brine contains traces of oil or emulsions.

A special chapter describes the soil and water resources of the Kansas oilfield areas. This chapter, written by Ogden S. Jones of the Kansas State Board of Health, describes the fertility and porosity of the surface soils with respect to the location of the freshwater horizons. The porous nature of formation outcrops in eastern Kansas and the highly permeable surface soils in central and western Kansas are discussed. Illustrations include a map of the surface soils of Kansas, also the location and source of municipal water supplies.

Copies of Report of Investigations 3394, "The Disposal of Petroleum Wastes on Oil-Producing Properties" with a special chapter entitled, "Soils and Water Resources of Kansas Oil Areas," published in coöperation with the Kansas State Board of Health, are available without charge from the Information Division, Bureau of Mines, Washington, D. C.

Difficulties were encountered in laying the Bay Pipe Line Company's new line. About 70 percent of the line was laid under conditions pictured here

By
NORMAN X. LYON

Construction during 1938 may exceed year-end forecasts as a result of recent developments

Numerous Pipe Line Projects in Michigan

PIPE LINE construction in Michigan during 1938 may prove decidedly greater than predicted by year-end forecasts as a result of a number of developments during the first quarter.

The Bay Pipe Line Corporation began regular delivery of crude oil from the Buckeye field, Gladwin County, March 25, to its affiliated refinery, Bay Refining Corporation, through a new 33.4-mile, 6-in. pipe line constructed early this year.

The pipe line is the fourth to be laid to the Buckeye field, which was discovered in January, 1937. As constructed and equipped, the system has a capacity of 10,000 bbl. of crude oil per day at a working pressure of 461 pounds.

Equipment at the pumping station, situated in the South Buckeye field, includes two 40-hp. gas-oil convertible engines, belt-connected to 5-in. by 10-in. pumps. The Bay City, Michigan, terminal, is at the Bay Refining Corporation's new 4000-bbl. topping plant, which at the present time is the principal destination for the oil transported through the line; however, when a terminal is completed on Saginaw Bay, boat shipments of crude to Buffalo, New York; Toledo, Ohio; Chicago, Illinois; and points in Canada, will be possible.

The Rich Construction Company, Bradford, Pennsylvania, had the contract for laying the line, subletting the stringing to Trojan Trucks, Inc., Mt. Pleasant. Although the entire 33.4 miles of right-of-way is comparatively flat the stove-pipe method of construction was used because of the shortness of the line and general weather conditions. The first ten miles on the Bay City end of the job offered fairly good right-of-way but as the job progressed toward the field terminal contractors had zero weather, mud, heavy timber land, and a highly irregular terrain with which to cope.

Construction began February 21 on Michigan-Toledo Pipe Line Corporation's 28-mile, 8-in. loop between the Mt. Pleasant and Crystal stations, and was completed March 12. The line was placed in regular service on March 21, with a throughput of approximately 20,000 bbl. of crude per day. Pump stations, formerly needed to maintain a 17,000-bbl. per day schedule through the old 6-in. line, are being dismantled at Riverdale and two other points on the line. D. Y. Hewitt, superintendent, said the company plans construction in early summer of a new pumping station at Mt. Pleasant to give the Mt. Pleasant-Crystal section of the line a 27,000-bbl. per day capacity. The Berea Construction Company had the contract.

Laying of the loop was to relieve pumping conditions, as this line carries most of the oil moved from Michigan. It serves both the Buckeye and the Greendale-Porter districts.

The last of March, the Michigan-Toledo Pipe Line Corporation had under test 5.6 miles of 6-in. line from the new Edenville field, Midland County, west to the Pure Transportation Company's 6-in. line, which terminates in the old Greendale field, and connects with Michigan-Toledo's 6-in. line between Greendale and the Mt. Pleasant station.

Details were consummated March 15 for the purchase by the Michigan-Toledo Pipe Line Corporation from Pure Transportation Company of the 29.4 mile, 6-in. line, constructed in the spring of 1937, between Greendale pump station and the Buckeye field. The gathering system in Buckeye, operated by Pure, was purchased by Simrall Pipe Line Corporation, an affiliate of Michigan-Toledo.

Current speculation is running high on possibilities of the Sun Oil Company constructing either a 6-in. line from Buckeye to Bay City, about 30 or 35 miles, or directly to Toledo, Ohio, where the company has a large refinery. Sun has about 65 percent of the proven acreage in the Buckeye field and controls about 25 percent of the current output of 26,000 bbl. per day. Discovery of the Edenville field, Midland County, ten miles south of the Buckeye field, where Sun has 85 percent of the acreage, adds strength to that company's long-considered plan of entering the pipe line field in Michigan.

United Fuel Oil Corporation, Detroit, in conjunction with several major and independent buyers and producers of crude oil, has under consideration the construction of 26 miles of 4-in. or 6-in. pipe line between the Ogemaw-Arenac fields and a Saginaw Bay terminal. After right-of-way surveys had been made early in March,

and the plan disclosed, however, protests were made by resort interests on the bay and by those concerned with the pollution of fresh waters, including the State Stream Control Commission. The outcome of this controversy is still uncertain.

United Fuel Oil Corporation, which has extensive markets for the type crude being produced in the Ogemaw-Arenac district, had proposed to construct on Saginaw Bay a floating dock, and storage capacity of 250,000 bbl., to be used principally during the closed season of lake navigation.

During the past winter, Ogemaw-Arenac operators found it unusually difficult to dispose of crude due to inadequacy of transportation facilities, resulting in a price decline and about a 60-percent decline in shipments from the district. Operators believe that the only solution to the problem is construction of a pipe line to Saginaw Bay, which opens into Lake Huron, to provide a connection by tanker with Buffalo, Toledo, and Chicago.

Expansion of the 1600-ft. Traverse sand fields in Allegan County, Western Michigan, is expected to result in some pipe-line construction in that district before the end of the summer, the line going 50 miles north to the Muskegon refining area, 38 miles east to Grand Rapids, or 30 miles west to Holland.

Comparatively new fields in Allegan County produced about 140,000 bbl. of oil in March, all moved by truck.

Gas pipe line construction also may get impetus due to several developments this year. Four wildcat wells have had showings of gas in commercial volume and should additional drilling establish fields, several lines, ranging from 15 to 90 miles in length, probably would be laid.

A 400-mile gas pipe line has been proposed by the Independent Gas Producers Association of Michigan, and the Michigan Public Utilities Commission has proposed that application be made for a Federal loan to aid in financing the project, if private capital is not available.

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

Industrial Efficiencies Advance with Redesigned Equipment

A SURVEY conducted for the Electric Welding Section of the National Electrical Manufacturers' Association emphasizes the new trends of application of the metallic arc-welding process. The welding arc has ceased to be an incidental tool, restricted to a limited field of minor assemblies, and has acquired the status of an important fabricating method on the modernized structures that are responsible for numerous long-range economies in the heavy industries.

It required some 40 years of intense study to make this process suitable for assembling structures in which safety and dependability are of vital importance. The great obstacle was that liquid steel while passing through the arc picked up harmful elements from the atmosphere with the result that the weld zone did not equal the full strength of the adjacent parent metal. Science eventually overcame this obstacle by surrounding the welding wire with heavy coating that would melt simultaneously with the wire and prevent the atmosphere from reaching the weld metal. It then became possible to deposit weld metal that would be 100 percent as sound and strong as the material it joined. This development is the real basis of important design trends that were noted in the course of the survey mentioned.

The petroleum industry is among those using arc-welded construction on an extensive scale. In the course of a year this industry forces billions of barrels of highly inflammable and explosive materials through hundreds of thousands of miles of pipe lines, storage tanks, pressure vessels, process piping, and delivery systems. These materials are handled at temperatures from 150 deg. below zero to 1100 deg. above zero and at pressures ranging from a high vacuum to 1500 lb. per sq. inch.

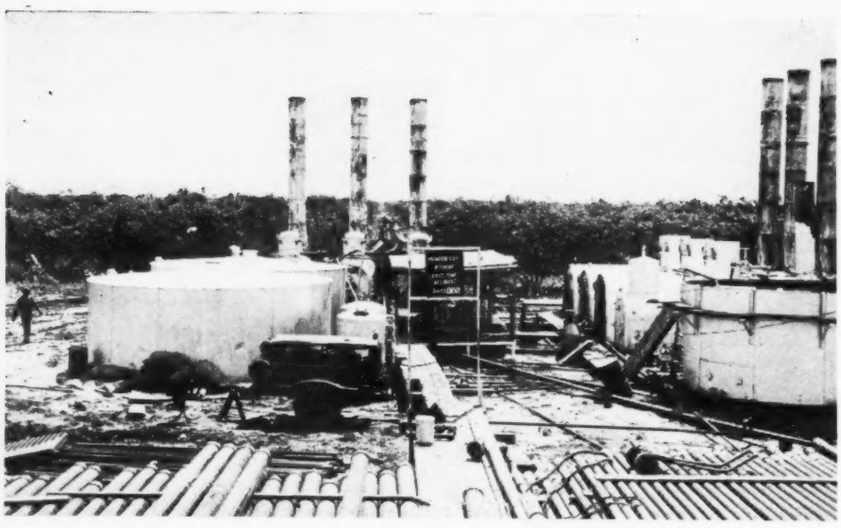
The petroleum industry began using welded cracking stills about 1925 and there resulted immediately a program of advancing not only the temperatures and pressures used in cracking but also volume capacity of refinery units. Within five or six years it was estimated that about 1500 welded pressure vessels were installed by refineries; in the next five-year period about 7000 more. The effect on the economics of refining has been to increase the productive efficiency, that is, the proportion of gasoline recovered from crude, by 50 percent.

What this means to the petroleum industry and to the motoring public must be based on the fact that the market for gasoline is created by the automobile manufacturers. The demand depends upon the number of cars in use. This number increased from 20 million in 1925 to 28 million in 1936; and the 1936 demand was for 481 million bbl. of gasoline. In order to fill this demand with the refining equipment available a dozen years earlier it would have been necessary for the petroleum industry to produce an additional supply of petroleum estimated at a billion barrels.

Therefore, the economic significance of redesign in the petroleum story is not a matter of first construction cost but rather a matter of eliminating the need for producing, transporting, and refining double the amount of raw material actually used and along with it the elimination of the need for capital investment in oil field equipment, pipe lines, storage tanks, and refinery equipment. A further advantage in the use of increased pressures and temperatures is that a gasoline of higher anti-knock value is obtained.

The conservation of the natural deposits of crude petroleum also is a big factor in this picture, as the cracking process in its present state of efficiency annually conserves a greater volume of crude than is being taken from the ground.

Petroleum also has a transportation problem. The magnitude of it can be judged from the fact that it has in operation already about 220,000 miles of pipe lines. About ten years ago the shielded-arc process came into use for fabricating line pipe and for joining this pipe together into transcontinental transportation systems. Reducing the per-mile cost of pipe line construction made it profitable to lay pipe lines for carrying natural gas from the oil fields of Texas and Oklahoma to kitchen ranges in the industrial cities of the central west. These are redesign economies of major importance. The complete story of oil is a continuous flow from the oil field through the refinery and through distributing systems to the welded underground tank at the filling station and finally through a welded pump into the welded tank of the automobile. By such universal application of the process the petroleum industry has eliminated many serious losses due to leakage, evaporation, corrosion, fire, and explosion.



Six 125-hp. boilers are used for power at Magnolia's No. 1 Francisco Armendiaz in southeastern Willacy County. Fuel oil is brought to the well by barge up the Arroyo Colorado from the Gulf of Mexico. Oil is pumped three-quarters of a mile from the Arroyo to the three storage tanks shown in the foreground

Use of ice water in making slurry facilitates cementing of heavy string of casing

String of 8⅝-in. Casing 9634 Feet Long Set in Well in Rio Grande Valley, Texas

ONE of the longest strings of 8⅝-in. O.D. casing ever run in a well was successfully cemented at a depth of 9634 ft. on March 30 in the Magnolia Petroleum Company's No. 1 F. Armendiaz, in southeastern Willacy County in the lower Gulf Coast area.

Magnolia plans to drill the well to a depth greater than 12,000 feet. Its present total depth of 9635 ft. is exceeded in the southern part of the coastal area only by the 10,286-ft. depth reached in the Shell Petroleum Corporation's No. 1 Yturria Land and Livestock Company in western Willacy County last year.

The diameter of the hole was reduced to 9⅞ in. after 13⅜-in. O.D. surface casing had been cemented at 2480 feet. The hole was reamed to 11¼ in. to run the large pipe. A temperature test showed a bottom-hole temperature of 230 deg. fahrenheit. Knowing this extreme heat would present a difficult problem, the operators decided to use a slow-setting cement and iced water to make the cement slurry.

The 8⅝-in. O.D., 44.7-lb. seamless casing string had a gross weight of 430,000 lb., or 215 tons. In order to support this weight, drillers rigged ten lines through the traveling and crown blocks. Despite the resulting reduction in speed, the string was run and cemented in 25 hours.

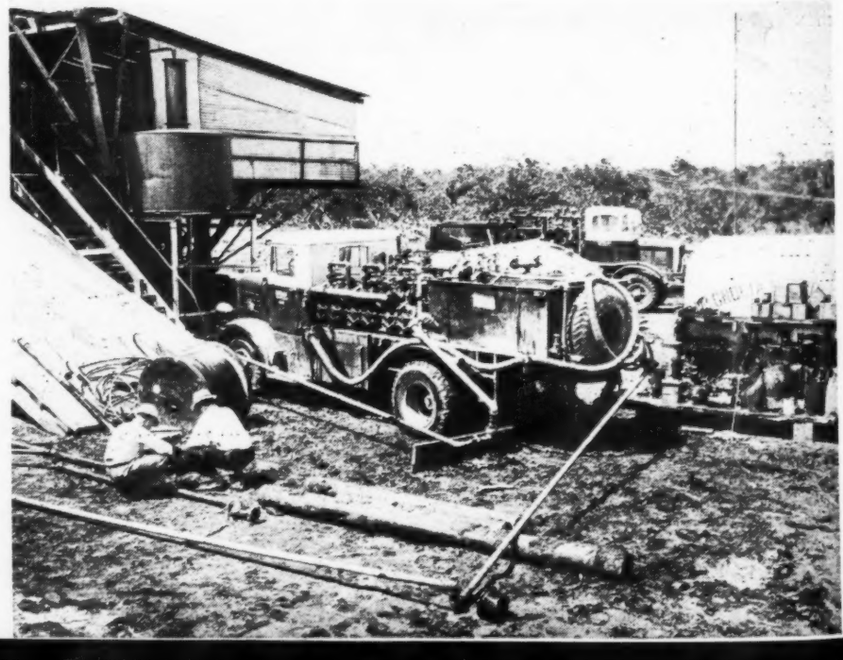
It was decided by the operators to pump water direct from the boiler pits; so the pits were filled with 14 tons of ice and as much water as possible. The temperature of the water was reduced to about 40 deg. as the slurry was mixed and pumped into the hole. After each 500 ft. of casing was run, fluid was pumped through the string to be certain that circulation was maintained, and when 5000 ft. of pipe had been run in the hole, circulation was maintained steadily for one hour before running the rest of the casing.

A total of 1000 sacks of cement was used in cementing the string.

Schlumberger electrical survey of the lower 170 ft. of the hole had shown a gas sand at a depth of 9610 to 9620 ft. having a resistivity of about seven ohms. After cementing the long string and studying the electrical log, the operators decided on a production test of the sand. The casing was gun-perforated on April 12 with ten shots and a drill stem test was made. The sand showed 75-lb. gas pressure and produced 650 ft. of mud cut with gas in the 30-minute test, the testing tool having a 3/16-in. choke on bottom and a ¼-in. choke on top. As the volume of gas appeared to be small, the perforations were cemented under pressure and it is planned to resume drilling about April 20.

About 12,600 ft. of new 3-in. drill stem was on the pipe-racks at the well and the hole will be carried at least that deep if possible. New interest was aroused in the wildcat when it was learned that the first sand showing either oil or gas was found in the top of the Frio, this being the sand tested at 9610 to 9620 feet.

W. H. Pardue, connected with the production department for several years, has been in charge of the No. 1 Armendiaz since it was spudded on September 9, 1937.



Two large Halliburton trucks were used during the cementing operations

LOPY"
Industry

LIKE THE "JALLOPY" OF OLD . . . the Standard Rig was a good "job" in its day. But no one would buy and use an outmoded "Jallopy" in preference to the modern, efficient, stream-lined automobile of this age.

The same is true of pumping equipment. Wherever the "Jallopy of Oil Well Equipment" (the old Standard Rig) is in use, it is being rapidly replaced by the "Rolls Royce" of gear reduction units . . . efficient, trouble-free, LUFKIN units.

And, believe it or not, like the stream-lined automobile in comparison with the old "Jallopy," the cost to install is less for the compact, efficient, LUFKIN unit as against the cost of the old Standard Rig.

A modern installation of LUFKIN Universal Herringbone Gear Pumping Unit Assembly on the lease of a major oil company.

UNITS

LUFKIN UNITS are manufactured in Lufkin, Texas, by the Lufki
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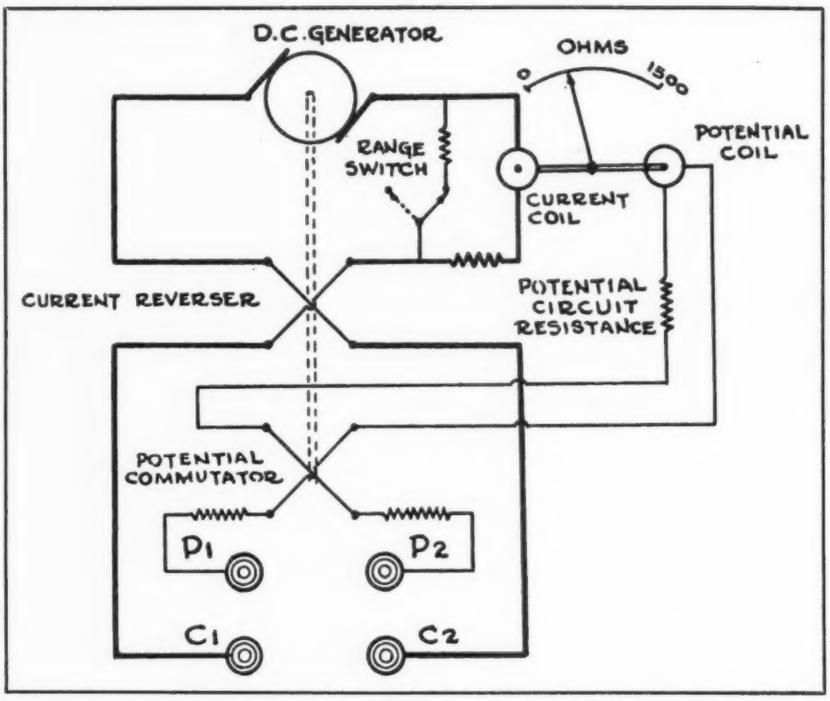


Fig. 1. Internal connections of Megger ground resistance tester

By
L. M. GOLDSMITH
Chief Engineer, The Atlantic Refining Company

Earth Resistivity Measurement*

THE author has had an opportunity during the last ten years to study and digest a wealth of papers and data concerning the corrosion of pipe lines in the soil. In addition to this, he has had the opportunity in this decade to go through that period when we put no protection whatever on the pipe, to that period when we hot-coated the pipe for its entire length, regardless of conditions. We learned, to our sorrow, that we were wrong in the first case by not using any protection and paid for it in corrosion and lost time. We paid immediately, in the second case, by spending money needlessly when there was no occasion for it. Now, during this same period, operating pressures have greatly increased for nominal size pipe. The reasons, of course, for this are economic, which will not be dealt with here, but it is brought out to show that the increased pressures make more important the problem of protection from corrosion. From this experience, it was indicated to us that a real study should be made in order to arrive at some basic principles, resulting in a method that could be qualitative, but must be accurate, as an indication of those points in the soil where the pipe must be protected from corrosion.

This problem became magnified when it was decided to build an entirely new pipe line in a territory not previously covered by our company, known as the Keystone Pipe Line, which is a product pipe line in Pennsylvania. Therefore, the work done and data given, to which this paper refers, were worked out for this particular problem.

Approximately 535 miles of electric-welded seamless steel tubing, varying from 4 in. to 12 in. in diameter, has been laid by the Keystone Pipe Line Company through most of the soils encountered in Pennsylvania. These include the swampy lowlands near the Delaware River, the rich fertile loams of the Pennsylvania Dutch section, and the rock-mining districts of northeastern and western Pennsylvania, as well as many miles of cinder-filled railroad right-of-way, etc.

Our studies and actual use of existing instruments and methods left much to be desired in our minds, and what follows here is a result of both our theoretical study and our practical application work.

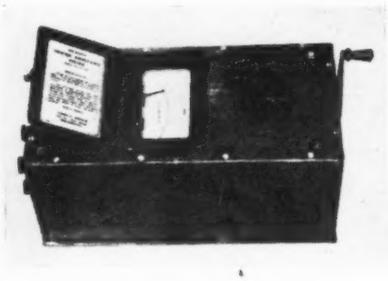
We are discussing only the question of corrosion produced by galvanic currents and have purposely left out of this discussion anything concerning the corrosion due to stray currents from outside sources, such as trolley lines.

We believe that most people are in agreement that the four chief factors influencing soil corrosion are:

1. Acidity (whether the soil is alkaline or acid and how much).

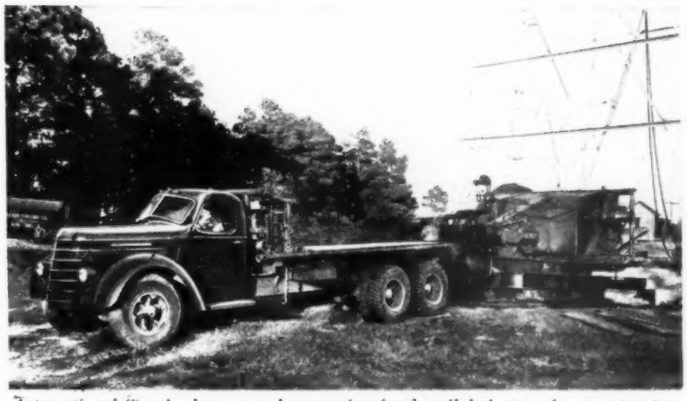
2. Texture (mechanical analysis—sand, rock, loam, silt).

Fig. 2. Megger ground tester open and ready for use



*Paper presented at National Bureau of Standards' Fourth Underground Corrosion Conference, Washington, D. C., November, 1937.

International Harvester POWER in the PETROLEUM INDUSTRY



International Trucks have a real reputation in the oil industry. As one operator says, "You can tell the world you have the champion of trucks—a truck that doesn't know the meaning of the word 'quit'."

This International Half-Ton unit is used by Cavins Co., Long Beach, California, in the servicing of boilers and pumps in the field

New plans, new projects, new methods, and *new equipment* are to the front today in the world of oil. International Harvester moves forward with this great industry, constantly building improvements into its line of motor trucks, industrial tractors, and power units. The results — *more work accomplished at lower costs* on the great variety of jobs needing this equipment.

At the International Petroleum Exposition in Tulsa, *International TracTracTors, Wheel Tractors, Power Units,* and *International Trucks* will be on display in Harvester's own exhibit. Throughout the grounds, you will see scores of manufacturers exhibiting equipment designed for operation with International Harvester products.

Visit our exhibit at the Oil Show. Get acquainted with International Harvester branch-house facilities by calling on our Company-owned branch in Tulsa. Also ask our nearby branch or dealer for complete details.

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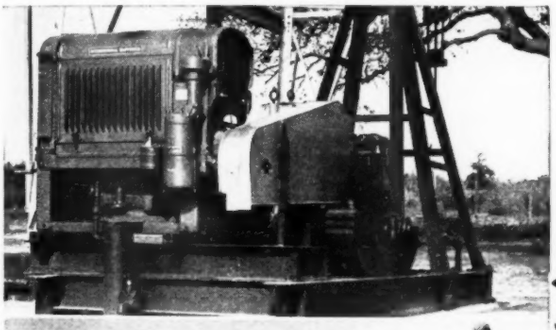


LEFT—An International Power Unit providing smooth, reliable power for this well on the pump near Pettis, Texas

BELOW—Digging a slush pit in the Clarkwood, Texas, field with an International TD-40 Diesel TracTracTor owned by H. H. Howell

An International T-40 TracTracTor owned by T. R. Jones of Dallas, Texas, laying 80-ft. lengths of 14-in. pipe near Emporia, Kansas

INTERNATIONAL HARVESTER

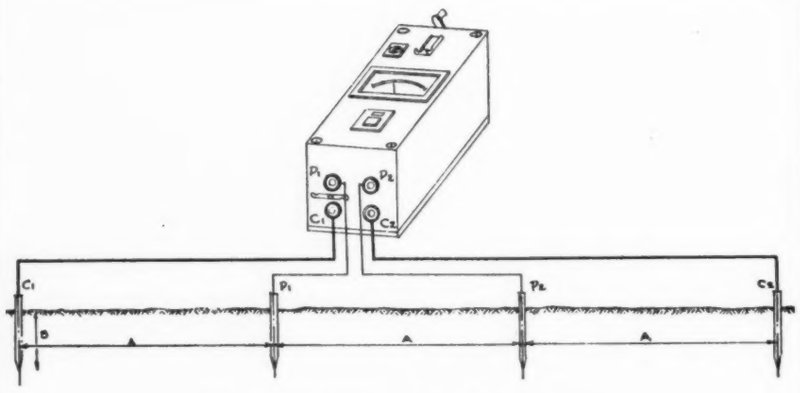


Fig. 3. Measurement of soil resistivity

In U. S. Bureau of Standards Bulletin No. 258, entitled "A Method of Measuring Earth Resistivity," Dr. F. Wenner shows that if two current electrodes and two intermediate potential electrodes, of small size, are buried in earth, all at equal distances A apart in a straight line, and at a depth B, and the resistance R between the two potential electrodes is measured, then:

$$p = \frac{4\pi AR}{1 + \frac{2A}{\sqrt{A^2 + 4B^2}} - \frac{2A}{\sqrt{4A^2 + 4B^2}}}$$

Where p = average resistivity of the soil. (If A and B are in centimeters, p is resistance per centimeter-cube.)

If B is small compared to A, as is the case when the electrodes are at the surface of the earth, then:

$$p = 2\pi AR$$

To use the "Megger" Ground Tester for this test, connect the instrument as shown in Fig. 1. C_1 and C_2 are the current electrodes; P_1 and P_2 are the potential electrodes; R is the reading on the scale when the crank is turned.

The resistance R is actually the resistance of the earth between the two equipotential surfaces with which P_1 and P_2 are in contact. If B is great compared to A, the resistance R is numerically the same as for a cylinder of earth of length A and radius 2A, measured between the parallel ends. If B is small compared to A, the resistance R is numerically the same as for a half-cylinder of length A and radius 2A, measured between the parallel ends. By this method the average value of p is determined to a depth equal to A.

3. Drainage (indicates moisture likely to be present).

4. Conductivity (resistivity readings show quality of electrolyte).

There is no question in our minds that the most simple and comprehensive method of determining corrosive soils is by the measurement of the resistivity of the soil. However, to cover the entire situation we take resistivity readings, examine the soil at intervals by chemical analysis, and we analyze the water in streams, ponds, etc., through which the pipe line runs.

The complete examination includes readings taken along the entire proposed route of the line for earth resistivity, with survey station numbers and resistivity readings recorded approximately every 300 ft.; types of soil encountered (that is, a description of the soil—sand, silt, loam, etc.) and a notation of the use to which the soil is put; such as, farm, forest, mountain top, valley.

In 1931 when we started our first resistivity tests, we were dissatisfied with the methods for observing resistivity then in use. Based on previous experience with measuring ground resistance of towers, substation grounds, etc., and some experience with geophysical prospecting we felt that the Wenner[1] Method offered the best and most nearly accurate means of determining the resistance of the earth.

Obviously, setting up instruments for making the Wenner test would not be practicable for pipe line survey work. We cast about for some means of combining the accuracy of the Wenner method with the portability of the Shepherd canes. The result: the Megger ground tester. Since 1931 we have made more than 13,000 readings, with complete satisfaction. How satisfactory, an examination of our corrosion experiences will reveal.

[1]United States Bureau of Standards Bulletin No. 258, "A Method of Measuring Earth Resistivity," by Dr. F. Wenner.

The fundamental principle of the operation of the ground tester is that of the a-c. fall-of-potential method as set forth elsewhere in this paper. In the instrument, a.c. is used for the test (so as to avoid the effects of polarization, electrolysis and stray current in the earth), but the result is indicated by a d-c. ohmmeter, which is also direct-reading.

Fig. 1 shows the essential electrical connections. Current is supplied by a self-contained d-c. hand-driven generator, and after passing through the current coil of the ohmmeter, is changed into a.c. for the test by means of a commutator or current reverser. The potential drop across the ground under test is picked up at P_1 and P_2 and again converted into d.c. for actuating the potential coil of the ohmmeter. Thus the result is shown at once by a d-c. ohmmeter, having all the advantages of sensitiveness and accuracy of this type of instrument.

The two coils of the ohmmeter are mounted on the same shaft and work in opposition in the field of a permanent magnet. Thus the instrument is a true ohmmeter and indicates R as a ratio of $\frac{E}{I}$, unaffected by the exact voltage generated in the armature, or strength of the magnetic field. There-

Fig. 4. The entire outfit is easily carried

Studying YOUR WELLS TOLD US HOW

You've heard us talk about low metalloids, notch resisting steels, fully normalizing and many other improvements that we have made in sucker rods—BUT do you realize that it was studying your wells that told us these improvements should be made. The knowledge gained from many fields, from many types of wells, has been the basis for the many improvements we offer in sucker rods.

Illustrated is a battery of automatic threading machines—just one step in the manufacture of Jones Sucker Rods—BUT an important one—important because your wells told us you needed uniform, accurate threading to assure tight joints that stay tight, and to avoid unnecessary pin breaks.

Let this example serve to illustrate the many things Jones has learned from your wells—and one of the reasons why you'll find Jones Rods fit your pumping conditions better.

one ucke ods

The S. M. Jones Company, General Office and Factory, Toledo, Ohio—General Sales Office, 518 McBirney Bldg., Tulsa
Southern Division Office, 506 Dallas National Bank Bldg., Dallas—Export Office, 19 Rector Street, New York City

Fig. 5. Operator taking a reading

fore, the reading will remain constant, even though the speed of the hand-crank is varied considerably. The current reverser and potential commutator are on the same shaft as the armature of the generator and so run in synchronism, whatever the speed.

As the moving element is without springs or mechanical control, the pointer will stand on the scale in any position until connections are made or the crank turned.

As the current sent through the ground by the instrument is alternating, errors due to stray current in the earth, and to polarization and electrolysis at electrodes, are eliminated. If there is any stray d.c. in the earth, the pointer will move up or down the scale as soon as connections are made. However, when the crank is turned the effect of all stray d.c. is removed.

Should there be any stray a.c. in the earth of a frequency nearly the same as that of the test current, the pointer becomes unsteady. The remedy is very simple—turn the crank slower or faster so as to make the frequency of the test current different by several cycles per second from that of the stray current. Thus the effect of all stray current is eliminated automatically without the use of a manually-operated compensating device.

In addition, the instrument offers advantages in that it is a complete unit in itself and can be easily carried in the hand. It contacts a large portion of the soil and consequently gives an average value for the particular reading rather than a spot value. In the high resistance type of instrument such as we use for this work, the contact resistance at the electrodes has little or no effect whatever.

Earth Resistivity Readings

Earth resistivity readings in ohms per cu. cm. are obtained by connecting a Megger to four electrodes or stakes in the manner explained in Fig. 3.

If stainless steel electrodes about 6 in. long are used with some sort of handle, for convenience, they can be attached to No. 14 Belden extra-flexible wire and bound up (Western Electric fashion), so that the wire itself serves as a measuring device. A fibre clip screwed to the Megger will also help to take the strain from the binding posts.

The Megger can be carried in the hand or with a shoulder strap and the electrodes stuck in the belt of the man carrying the instrument. A table of Megger readings against resistivity values can be made which will further facilitate rapid work.

The readings obtained with the use of this instrument are plotted against survey station numbers and curves are prepared for the entire route of the pipe line (Figs. 7, 8, and 9).

This gives a complete and permanent resistivity picture of the soils through which the pipe line passes. Low resistance areas can be quickly picked off from the curves and later when the line is completed and long-line current readings are taken the curves of resistivity values are very useful.

Fig. 6. Instrument set up for test

Conclusion

In the foregoing description we have described the method used for determining resistivity readings. With a

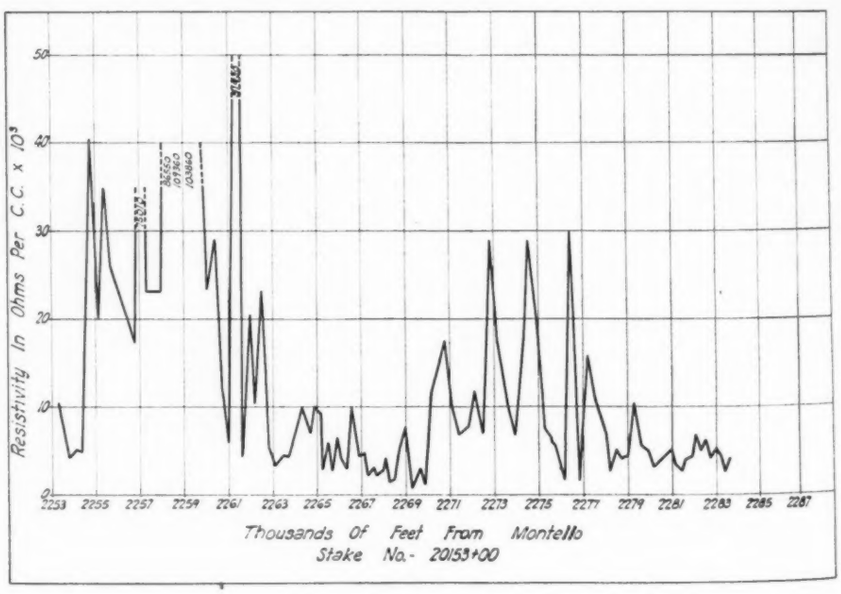
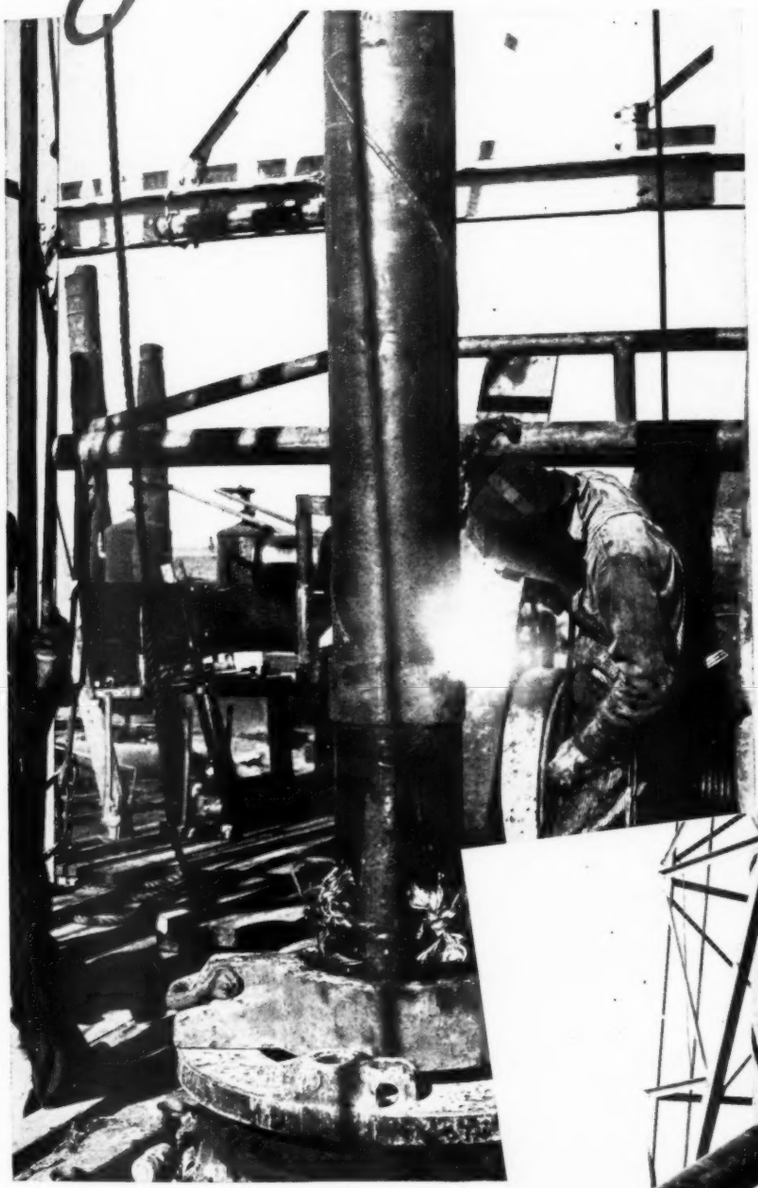


Fig. 7. Resistivity curves showing both high- and low-resistance areas. The high-resistance areas between 2255 and 2263 are characterized by limestone outcrops. The low-resistance areas are yellowish brown silt clay (probably Muskenzum Silt Loam).

8 Minutes Per Joint ...AVERAGE RUNNING TIME!



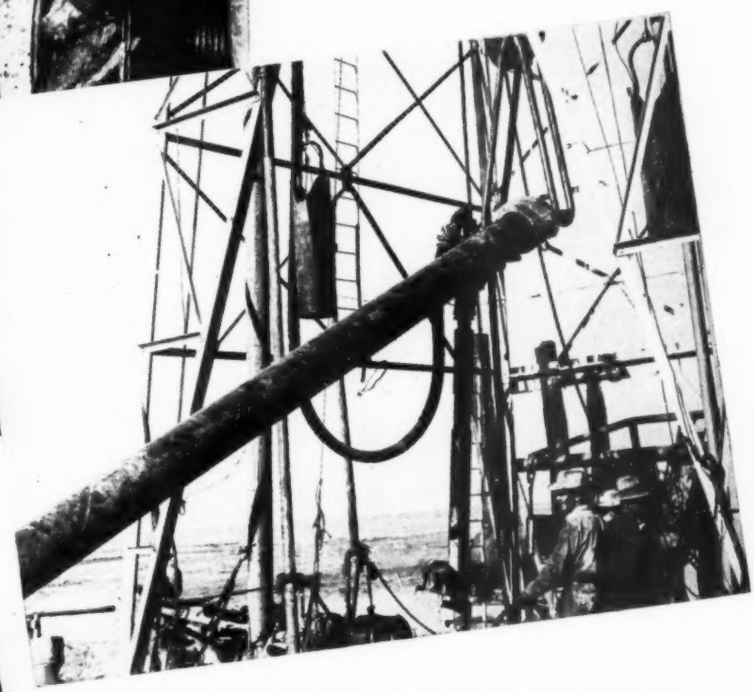
Here's real economy for you! Based on actual field studies, the average running time for Armco *Slip Joint* Surface Casing is about 8 minutes per joint with one welder. No special handling equipment or line-up clamps are necessary. And besides, you eliminate the extra cost of threaded ends and collars, which are of little value when the pipe is cemented in place.

For those who prefer threaded and coupled pipe, our distributor also stocks this type in uniform 30-foot joints. There is a diameter and wall thickness exactly suited to your requirements. Rapid delivery is assured. Just write, telephone or wire our distributor, or The American Rolling Mill Company, Pipe Sales Division, 1361 Curtis St., Middletown, Ohio.

Distributed by

NATIONAL TANK COMPANY

Tulsa, Oklahoma, and Branches



Above: Square ends of pipe in slip joint collar assure perfect alignment without use of line-up clamps. *Right:* With Armco Casing, no special expensive ends are needed on tongs, slips or elevators.

ARMCO SURFACE CASING

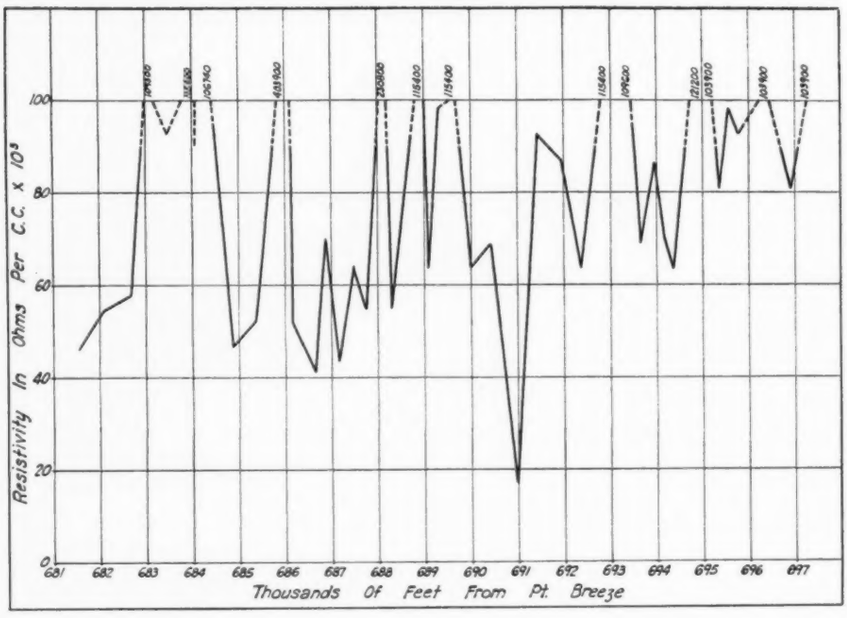


Fig. 8. High resistivity area data taken in mountains south of Wilkes-Barre, Pennsylvania

complete collection of curves and a tabulation of the data before us, we are equipped to analyze these data and determine areas where the pipe line should be protected. Our own method is as follows:

1. We protect the pipe line where the soil resistivity is less than 2500 ohms per cubic centimeter.
2. We protect the pipe line where soil analysis shows that the acidity of the soil is greater than 500 parts per million, calculated as H_2SO_4.
3. We protect the pipe line where it lies in ponds, streams, etc., where the tests indicate the water is acid to any degree whatever.
4. After the pipe line is laid, by a careful study of the resistivity, changes in the general type of soil can be observed and tests with recording millivoltmeters made that may further indicate corrosive areas.

Experiences

As we have stated previously in this paper, we have used this method since 1931 for the detection of corrosive areas, and have, up to this time, not had a pipe line failure due to soil corrosion.

During the summer of 1936 we examined 15 locations along the pipe line for the purpose of checking our protective measures. Four places were examined in high-resistivity areas. Six places were examined in low-resistivity areas where the pipe line had been coated. Five places were examined where the resistivity values were average; that is to say, they were between 4000 and 8000 ohms per cubic centimeter.

In the high-resistivity areas the pipe line paint (cold coater) was in the same condition as when the line was laid and no evidence of corrosion was discernible.

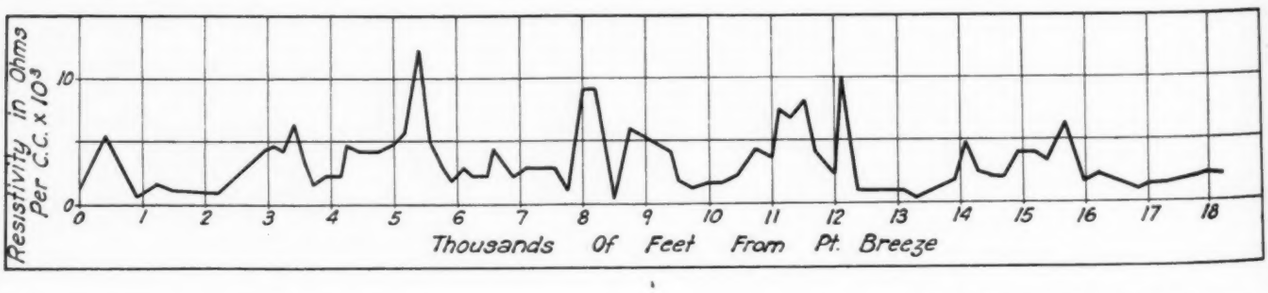
In the low-resistance areas where the pipe line was coated a priming coat and two applications of hot dope were applied. A tar-impregnated felt wrapper was applied while the second coat was still soft. Where the examinations were made the pipe line was in perfect condition although small amounts of water were detected at the bottom of the pipe between the wrapper and the coating. In the areas of so-called average resistivity no corrosion was noticeable.

In the normal course of our electrolysis test a section of pipe three feet long is uncovered every ¼ mile along the route, for the purpose of connecting test clamps. It is a routine matter for the electrolysis man to record the general condition of the pipe where the openings are made. To date all the reports have indicated that the pipe is in good condition.

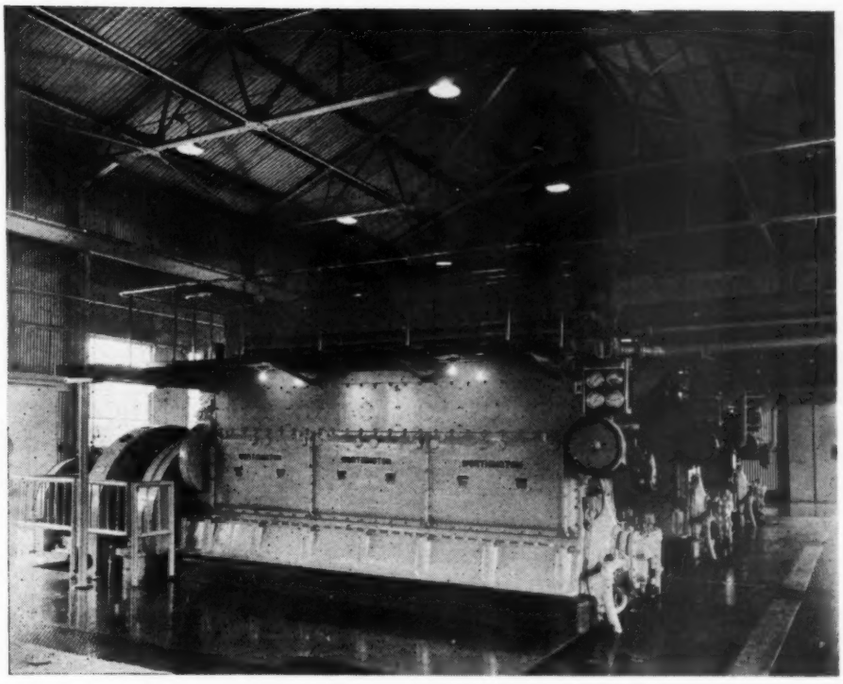
In fact, so complete has been our faith in the method that we had one rather amusing experience in connection with it. A leak in the pipe line about six miles south of Reading, Pennsylvania, was reported by the maintenance crew as an electrolysis leak. Examination of our files showed that there was no current flow on the line at this point; the potentials to earth were normal and the resistivity in the area was high. Also, because of the high resistivity and neutral chemical tests, the line was uncoated. So sure were we of our data, that we made arrangements for draining the line and removal of the repair clamp. Close examination showed that the "corrosion" was caused by the bit of a hand drill actuated by someone with the desire to obtain a free supply of gasoline. Since then our faith in the method has been unshaken.

It must be borne in mind, however, that when the data regarding resistivity and chemical analysis have been gathered together, the question of pipe line coating then becomes of primary importance, for obviously, unless coating of a substantial nature is applied to the indicated corrosive areas, trouble is bound to develop.

Fig. 9. Typical low resistivity area. Data taken in swampy lowlands of the Delaware River near Philadelphia



Interior of Magnolia Petroleum Company's Fitts power plant. Three 690-hp. engines drive the 625-kva. generators



By
LEO H. TOWERS

Five plants, each of different design, have a total capacity exceeding 7500 horsepower

Details of Power Plants in Fitts Pool

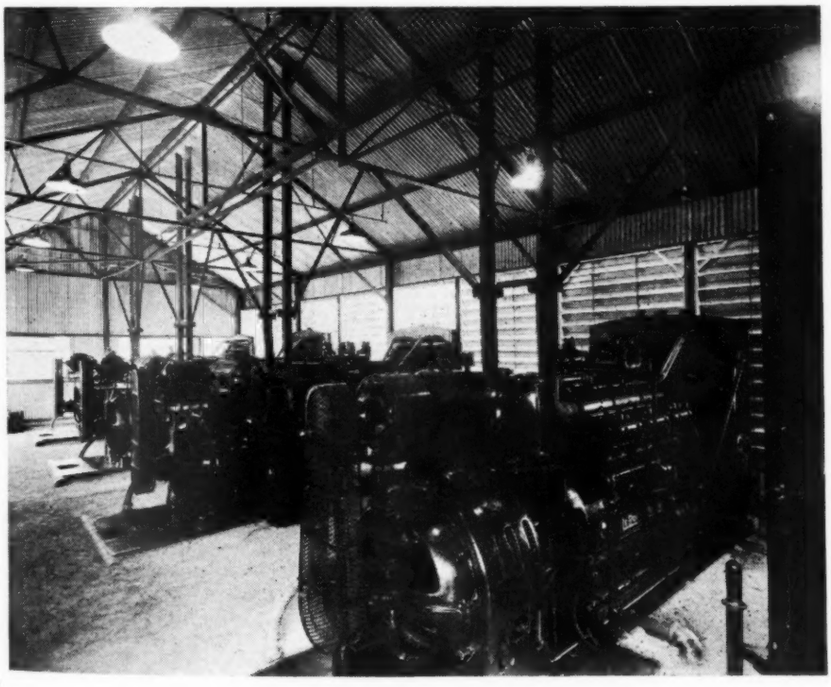
FIVE new company-owned power generating plants are now operating in the Fitts Pool, Oklahoma, to supply power for pumping wells, pipeline pump stations, gasoline plants, booster plants, and camps. The plants vary in size from a two-unit, 250-hp. station to a ten-unit, 4000-hp. station. The combined power generating capacity exceeds 7500 horsepower. Approximately 350 wells are now being pumped by electric motors driven by this power.

The first plant in the field was a three-unit plant built by the E. H. Moore Company, which was completed in the fall of 1936. As the pumping needs of the company increased the plant was enlarged until it now consists of ten units and is the largest of the five plants in the field. All ten units are identical and consist of Cooper-Bessemer gas engines driving General Electric a-c. generators. The 400-hp., 8-cylinder, 11½ by 13½, 400-r.p.m. engines are direct-connected to the 312-kva., 4160-volt, 3-phase, 60-cycle generators; 7½-kw., 125-volt d-c. exciters are belt-driven from the main shaft.

The switchboard consists of 13 steel panels. Each generator has its own switch panel containing the meters, voltage regulator, and switch. The three additional panels control the outgoing lines from the station. The advantage of each power unit having its own panel is that in adding or withdrawing a unit the panel for that unit may also be added to or withdrawn from the switchboard with a minimum of work and disturbance. The switchboards at all plants are equipped with the new General Electric direct-acting voltage regulators. Panel instruments are equipped with such new features as anti-glare glass and pointers on the dials in the plane of the scales to prevent errors due to parallax.

The plant is adjacent to the com-

(Continued on Page 80)



Phillips Petroleum Company's 4-unit plant in the Fitts pool; 12-cylinder, V-type, 260-hp. engines drive the 219-kva. generators

1909 1938

A Policy Established Almost 30 Years Ago Proves its Worth in the Hughes Rock Bit

Almost 30 years ago Hughes Tool Company established the following policy:

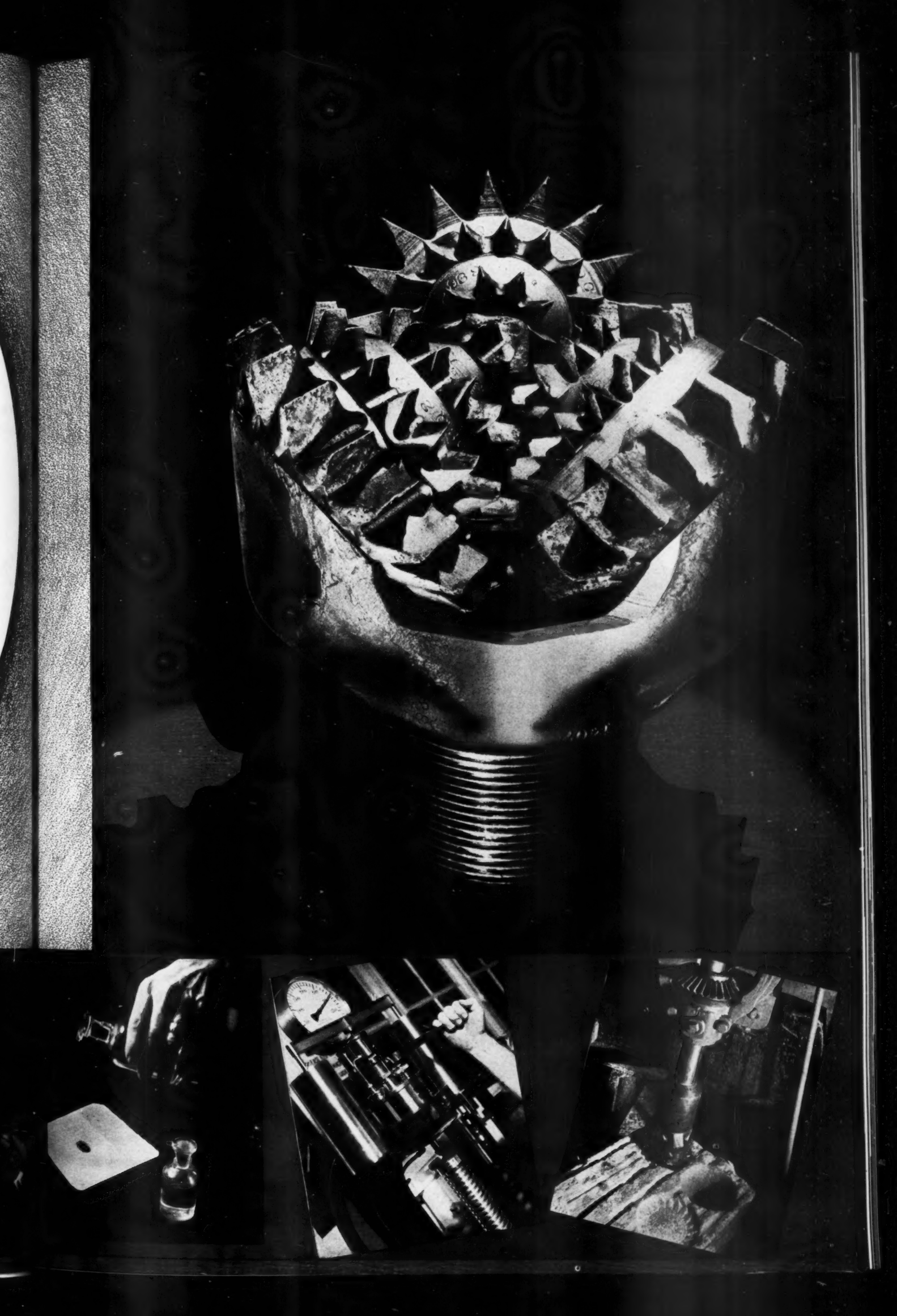
"A definite part of every dollar received from the sale of a Hughes Rock Bit will be invested in assuring a better product to meet future drilling problems."

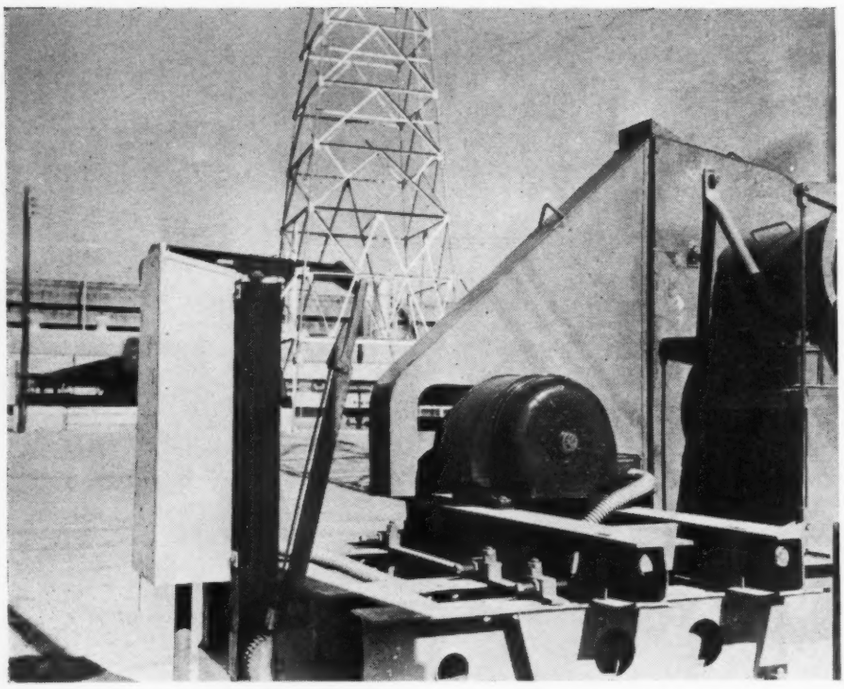
THAT policy has never changed and is in fact responsible for today's Hughes "Tailor-Made" Rock Bit. It is a policy that has proved itself in the crucible of time; one that gives assurance to the drilling industry for the future.

HUGHES SPECIALIZED OIL INDUSTRY TOOLS WILL BE ON DISPLAY AT THE TULSA INTERNATIONAL PETROLEUM EXPOSITION

Photographs below are (Reading from Left to Right):

Determining carbon content of steel by means of the Combustion Test. ★ Weighing carbon dioxide gas with a highly sensitive Chainomatic Balance. ★ Checking thoroughness of heat treatment by means of metalloscope. ★ Spot-testing steel for presence of nickel. ★ Master Brinell hardness tester, used for checking production machines and measuring hardness to the highest degree of precision. ★ Determining performance of various types of Rotary Rock Bits in different formations by use of Drilling Machine.





A 25-hp., 1200-r.p.m., 440-volt splash-proof, ball-bearing, squirrel-cage motor driving a pumping unit in the Fitts pool, Oklahoma

unit when future demands require it. The engines are designed for a rapid change-over to oil fuel. By replacing spark plugs with fuel injectors and by making slight changes in manifolding, the gas engine is converted to a Diesel in a few hours' time. Each engine has an independent closed cooling-water system, including an individual outside water cooler. The systems are so manifolded, however, that in case of trouble one engine may use the cooling-water system of another. Centrifugal pumps circulate water from the engine jackets through the cooling tower and back to the jackets. Starting air is obtained from two 6½ by 3½ by 4 compressors, one driven by an electric motor and the other by an air-cooled gas engine.

The latest type switchboard has been installed at this plant also. On it are controls to regulate the engine speed and synchronize a unit coming on the line with those already in operation without the operator leaving the switchboard.

Next in size is the Carter Oil Company's plant adjacent to its large gasoline plant. It consists of seven units at present, three units having been added to the four originally installed. The four units first built are 250-hp., 4-cylinder, 14½ by 16, 277-r.p.m. Cooper-Bessemer gas engines direct-con-

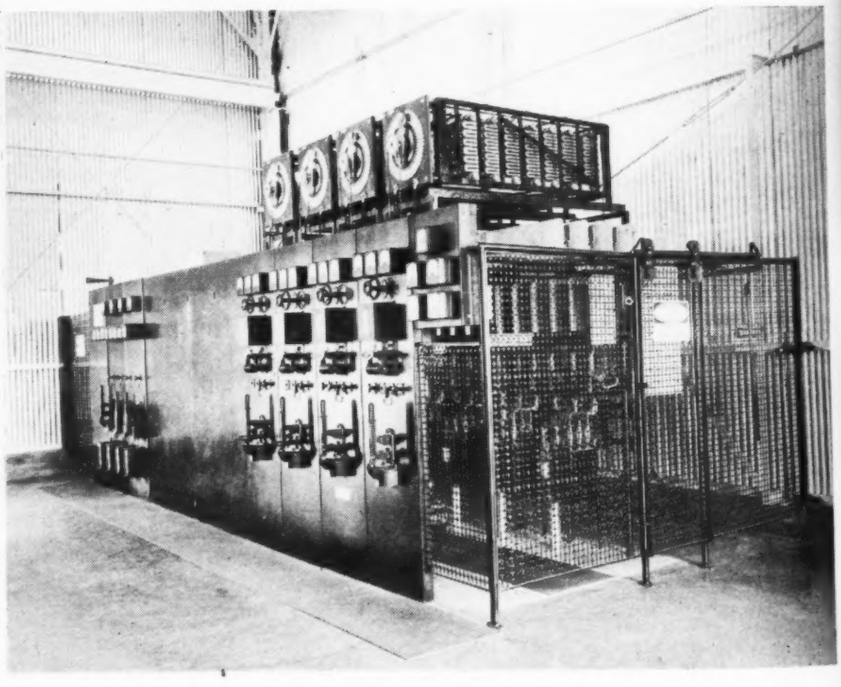
(Continued on Page 84)

(Continued from Page 77)

pany's booster plant and the same personnel operates both. This company also has the largest distribution system in the field. To reach the many leases 11½ miles of primary (4160 volts) transmission line and 15 miles of secondary (440 volts) line are required. The plant, using six units on the line, is now generating approximately 30,000 kw. per day for the 190 wells, and three units provide power for cleaning out. All wells are not on the line at one time but are staggered by groups. Power from this plant also operates the auxiliary motor-driven equipment about the power and booster plants and provides light for the large camp maintained by the company.

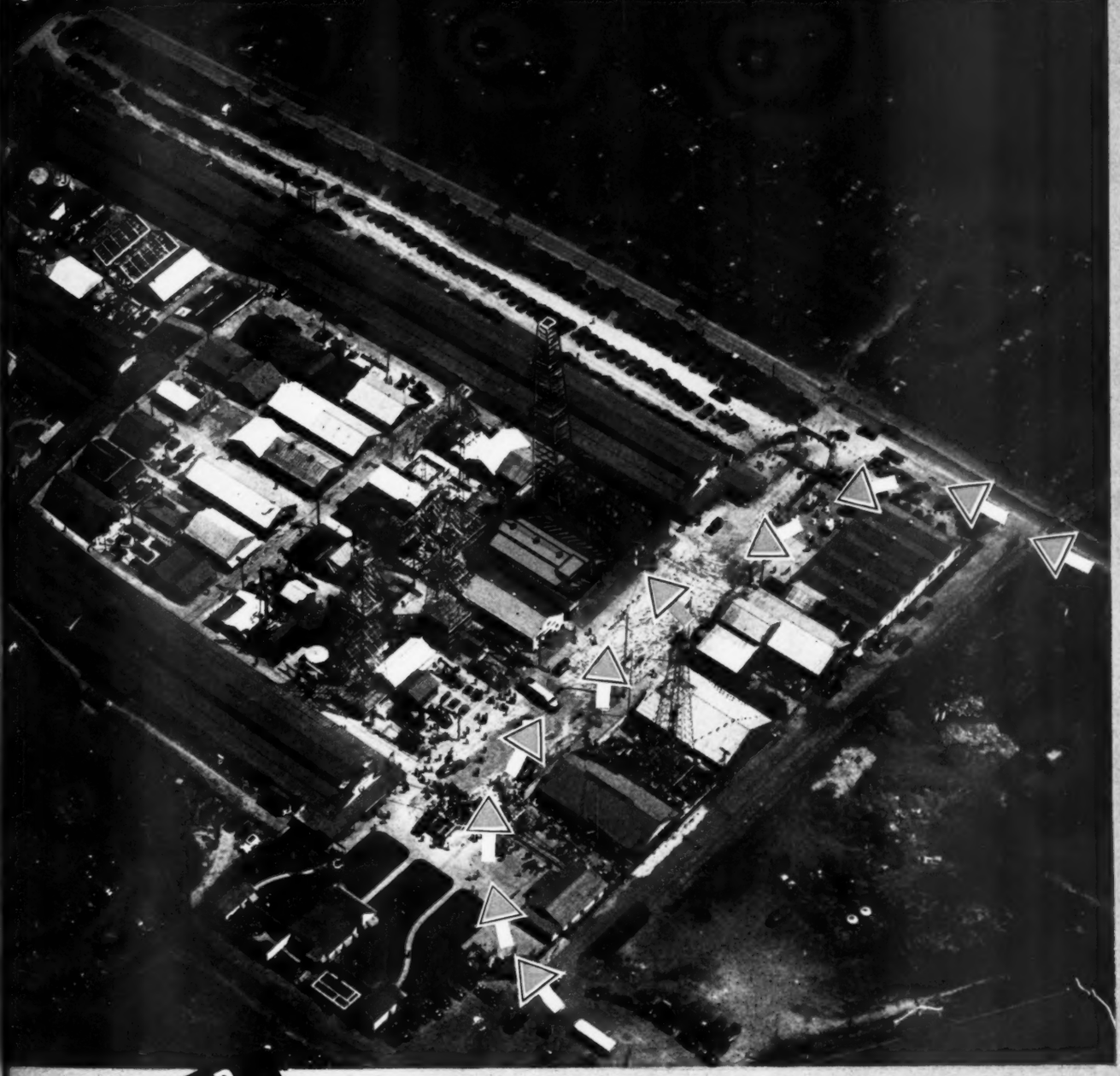
Near the east end of the field is the recently-completed plant of the Magnolia Petroleum Company, second largest of the group. Two of the three units in this plant are generating approximately 16,000 kw. per day. Power is used to pump 69 wells and to operate the Magnolia compressor plant a mile west of the power plant. The compressor station formerly generated its own power but the generating equipment has been shut down since the new power plant has been in operation.

Equipment at the Magnolia plant consists of three 690-hp., 6-cylinder, 327-r.p.m. Worthington convertible gas engines direct-connected to 625-kva., 4160-volt General Electric generators. Belt-driven from the main shaft of each unit is a 15-kw., 125-volt d-c. exciter. Space has been provided in the building for an additional



Switchboard in power plant, Fitts pool, showing four generator panels for 625-kva., 500-kw., 80 percent power factor, 4160-volt generators, and two double-circuit feeder panels and space for future panels. Each generator panel is equipped with an individual rheostatic-type generator voltage regulator giving automatic cross-current compensation

GREEN TRIANGLE

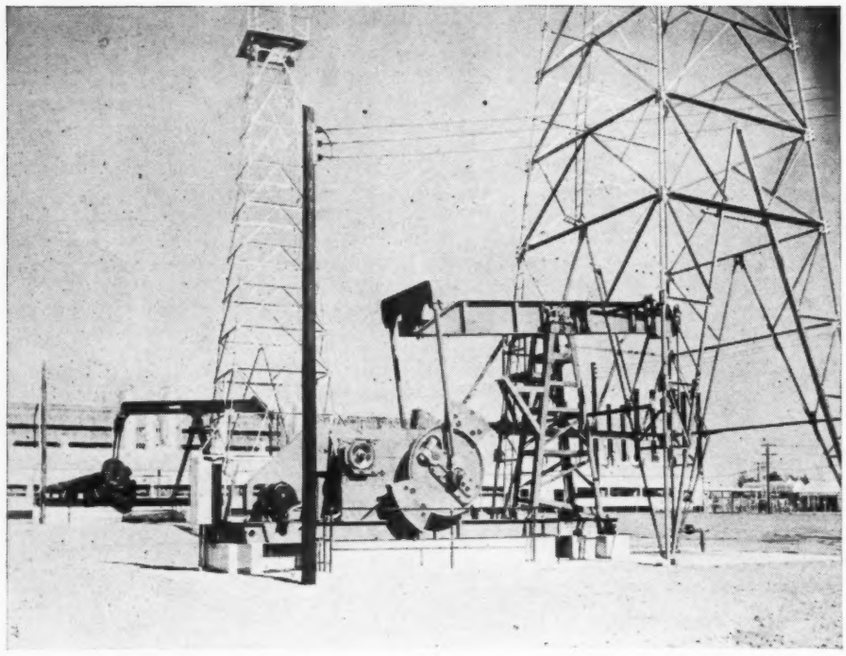


ASSOCIATED EXHIBITORS

Broderick & Bascom Rope Co.
Champion Machine & Forging Co.
Climax Engineering Co.
D & B Pump and Supply Co.
Emsco Derrick & Equipment Co.
Fairbanks, Morse & Co.
The Falk Corporation
Farrar & Trefts, Inc.
Gardner-Denver Co.
General Electric Co.
The Lunkenheimer Co.
The Mechanical Rubber Co.
New Bedford Cordage Co.
Westcott Valve Co.
Youngstown Steel Products Co.
Youngstown Sheet and Tube Co.

SERVING THE OIL AND GAS INDUSTRIES

NTINENTAL



Two pumping units driven by 25-hp., 1200-r.p.m., 440-volt splash-proof ball-bearing motors

(Continued from Page 80)

nected to 219-kva., 480-volt General Electric generators. The other three units are 300-hp., 6-cylinder, 11½ by 13½, Cooper-Bessemer gas engines driving 250-kva., 480-volt General Electric generators. Belt-driven 12-kw., 125-volt d-c. exciters are used on each unit. Approximately 55 wells are being pumped by power from this plant. More than 50 percent of the output, however, is used at the gasoline plant for operating the many auxiliary equipment motors. The plant is centrally situated with respect to the company leases and the total length of transmission lines is relatively small. The plant was originally built to serve only the gasoline plant and the camp, but now has been enlarged to provide power for well pumping.

The Phillips Petroleum Company is operating a 4-unit plant, already twice the size originally planned. This plant is different from the others described, principally with respect to portability. A complete unit, including lighter, higher-speed engines, is mounted on skids and can be readily moved by truck. Because each unit is set on skids instead of a concrete foundation, the plant floor is chat instead of concrete. A unit consists of a 260-hp., 12-cylinder, 6¾ by 7, 900-r.p.m. Le Roi gas engine direct-connected to a 219-kva. Electric Machinery Manufacturing Company generator. The 5-kw., 125-volt exciter is belt-driven from the main shaft.

The engines are V-type, valve-in-head. Electric starting equipment for each engine consists of a generator and storage battery, and a dual ignition system is employed. Cooling-water is circulated through super-capacity radiators set inside the building. The north and south walls of the building are made of a series of louvers from the floor line to a height of eight feet. These louvers can be opened to any desired extent, to provide air circulation. A dry sump lubrication system is used employing two pumps. The regular pressure pump circulates oil for the engine, and the scavenger pump takes the oil from the sump and returns it to the lube oil storage tank. The station is equipped with a panel switchboard similar to those in the other plants. A 4000-volt transmission line carries the power from the plant to the 15 wells now being pumped. Two units are on the line at the present time.

The Bishop Oil Company has constructed a 2-unit plant to care for the pumping needs of its lease in Section 28, T-2-N, R-7-E. Two 125-hp., 8-cylinder, 720-r.p.m. National Transit gas engines equipped with Bowser radiators drive the 94-kva., 480-volt General Electric generators. The 7.5-kw. exciter is mounted on the engine-generator shaft extension. This plant is situated in the center of the 50-acre lease and all wells are within a few hundred yards distance. In all, 15 wells are being pumped, an average of 12 being on the line at a time. One generating unit carries the load, the other being used as a standby.

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance

A Sound-Conditioned, Doorless Telephone Booth

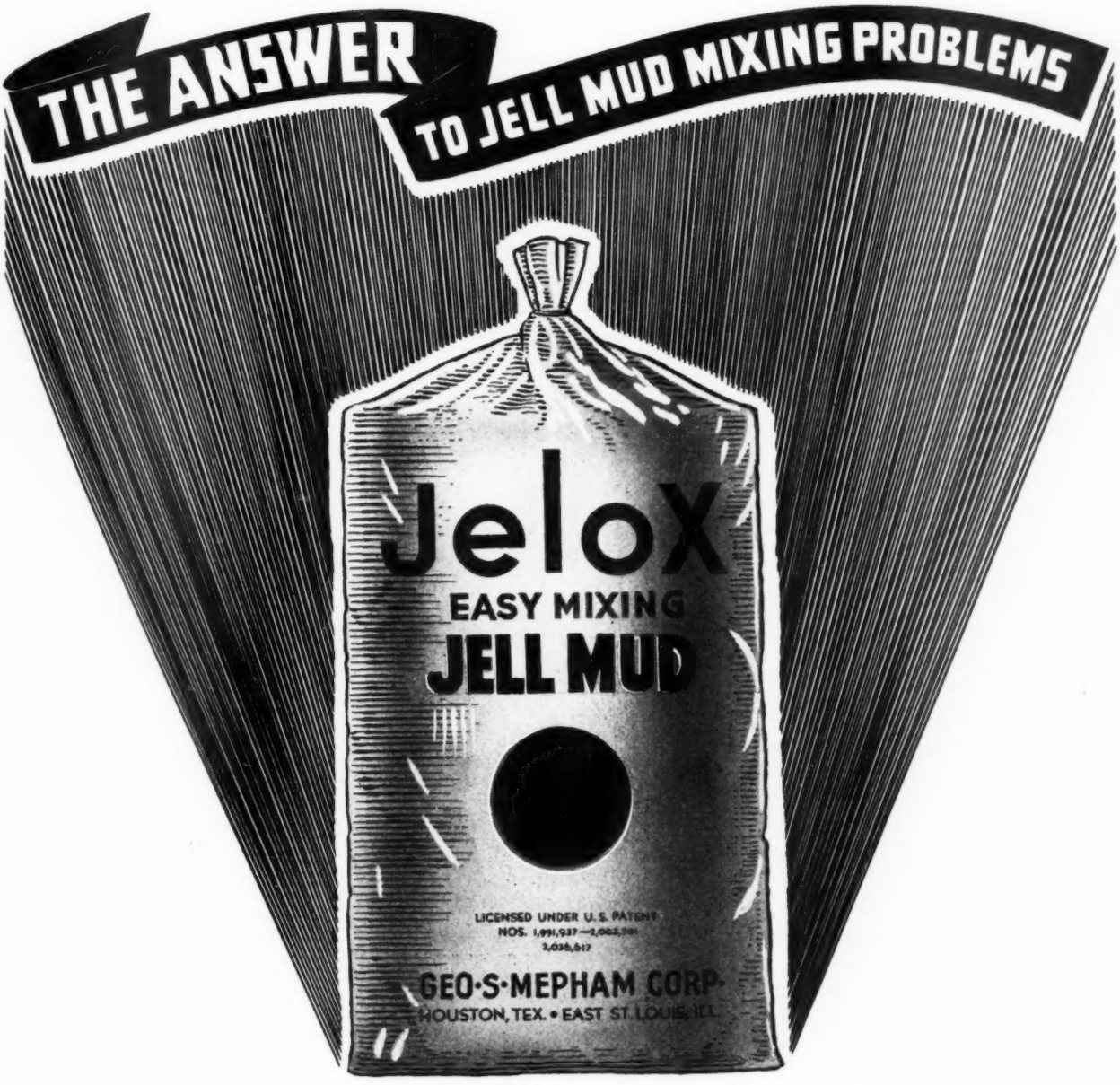
THE plant telephone plays an important part in the petroleum industry. Noisy conditions around a refinery, pipe line station, etc., however, often hamper a full use of the telephone. To improve hearing conditions in such places, engineers of The Celotex Corporation have recently developed a noise-proofed and doorless booth or kiosk that establishes a quiet hearing zone around the booth, yet leaves it readily accessible for instant use.

The completely-enclosed telephone booth has the disadvantage of requiring too much time and effort to open and close its door. The much-used plant booth, however, should be as open as possible and used with minimum effort. This has been accomplished in this new type of booth by lining its three sides and ceiling with sound-absorptive acoustical tiles that deaden the impact of intense sound waves much as a heavy carpet deadens a footfall.

In appearance, the booth resembles a conventional public telephone booth without a door. It is slightly deeper, however, thereby increasing the effectiveness of the acoustical lining. In addition, the instrument is placed on the rear wall so that its user must stand with his back to the opening, his body acting as a partial sound shield.

The lining is composed of 12-in. by 12-in. square tiles of Acousti-Celotex, 1¼ in. thick. Each tile is pierced with hundreds of small holes that soak up the sound waves and dissipate their energy through friction set up in the interstices of the material. The tiles are nailed to 1-in. by 2-in. wood furring strips that are attached to a light wood frame of 2 by 2's with 2 by 4 corner posts. The exterior of the booth is covered with a ½-in. thickness of Cemesto, a material composed of a core of Celotex surfaced with a thin layer of fire- and water-resistant asbestos cement.

THE ANSWER TO JELL MUD MIXING PROBLEMS



JELOX is fast replacing ordinary powdered bentonite in the oil country because it has made the use of jell mud practical, easy, and far more effective. JELOX does not float, but starts swelling instantly, and complete dispersion takes place 20 to 50 times as fast as powdered bentonite. Despite the many advantages of its patented features, JELOX costs no more than bentonite in its usual commercial form.

GEO. S. MEPHAM CORP.

Shell Building
HOUSTON, TEXAS

2001 Lynch Avenue
EAST ST. LOUIS, ILL.

Power Change Brings Pump Bearing Trouble

By CHARLES C. LYNDE

THE installation of additional pumps to double the capacity of a sub-tropic crude oil station was regarded as an opportune occasion for replacement of old, slow-speed gas engines by multi-cylinder high-speed Diesels. The 6¼-in. by 36-in., triplex, double-acting pumps were driven by jack shafts projected through a transverse fire-wall. The jack shafts originally carried flexible couplings on the power end of an 18-ft. 6-in. shaft. The horizontal engines were placed in a row in the main building and in line with the shaft.

The revised plan provided for two rows of 6-cylinder Diesels on this same main floor, driving the original pump jack shafts through bevel gears. The new pumps were to be erected parallel to those originally installed, but across the floor from them.

After pulling the pump side of the original flexible couplings, adjustable thrust bearings were installed to carry the thrust of the bevel gear mounted on the shaft, and the engines were aligned so that the pinion on the crankshaft stub would mesh directly with this bevel gear. The pump speed of 38 r.p.m. and jack shaft speed of 225 r.p.m. was maintained, the 6.18 gear ratio there being offset by a 4.45 ratio from engine to shaft. This gave a flat bevel on the drive with attendant tooth angle force acting directly against the adjustable ball thrust bearing behind the big gear.

As shown by the accompanying sketch, the 18-ft. 6-ft. shaft was carried on three adjustable pedestal or pillow bearings between the bevel drive and the herringbone pump reduction gearing, and on a fourth pillow block beyond the herringbone gears to support the end of the jack shaft. As these four bearings were the plain, sleeve-type babbitted shell, exercising no longitudinal restraint on the shaft, no provision was made to care for changes in center line distances caused by expansion.

Temperature within the station varies over a range of 72 deg. fahr. or 40 deg. centigrade. The effective length of shafting is 222 in., which, employing a normal mild steel shafting expansion coefficient, gives a shaft elongation of 0.002442 in. per deg. cent. temperature change. The maximum variation over the temperature range is plus or minus 0.09768 in., depending upon whether winter or summer length be taken as datum.

There being a space of more than four in. between each side of the herringbone pinion on the jack shaft and the supporting bearings, no consideration was given to the possible effect of temperature-induced elongation of the shaft when setting up the drives. That this was a serious oversight was proved shortly after the first of the new Diesel drives was put into service. The cheek of the center throw on the pump shaft began to bear heavily against the side of the main bearing at A in summer weather, the "hot spot" shifting to the other side of the big gear at B during cold weather.

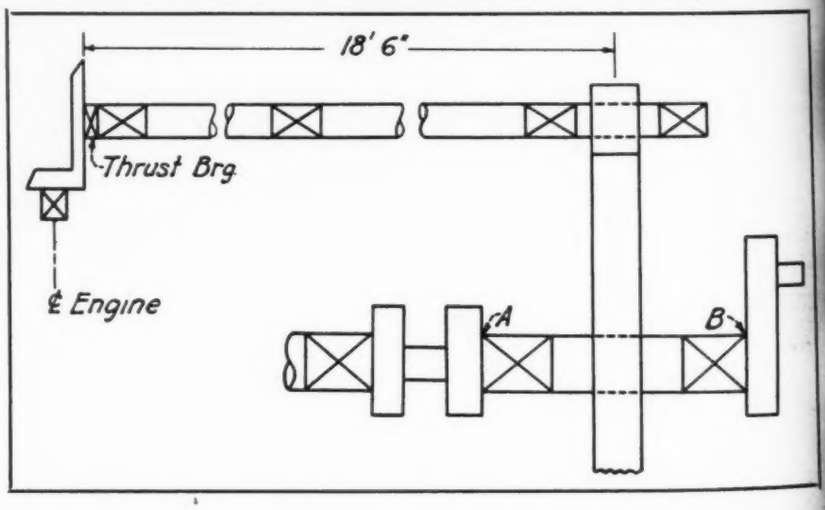
The original side clearance of crank throws and main bearings had been 0.015 in., plus any side wear that might have occurred during the many years of pump service, and this clearance had been checked after the engine drive had been set up and the engine grouted-in. For this reason the bearings were suspected of having worn out of true, and they were rebabbitted. Instead of conditions being improved, the heating was worse immediately, and was stopped only by facing off ⅛ in. of the babbitt on the normally abutting faces of the bearings, so that the big gear and shaft were free to float laterally in the bearings to the extent of the additional clearance provided.

Any lateral displacement of the pinion gear caused by change in length of the jack shaft would necessitate a shift of the big gear also, because of the inevitable interaction of the wedging teeth of the drive. Realization of this fact would have prevented trouble as it would have led to the continued use of some type of telescoping or flexible coupling, or to the adoption of the expedient mentioned—that of increasing the possible side travel of the pump shaft as the big gear followed the lateral push of the shifting pinion.

Because the lateral motion of the big gear was restrained by the cheeks of the crank throws, the travel of the pinion was also restricted. The shortening or elongation of the shaft under temperature changes caused pull against the thrust bearing (readily suppressed by the adjustment feature) during cold weather, or excessive tooth pressure in the bevel drive during summer months, which resulted in undue gear wear and severe side strain on the end bearing in the Diesel.

Drives subsequently installed on the opposite side of the station building included a flexible coupling in the jack shaft and an additional pedestal bearing to support the divided shaft and to relieve the coupling of all pressure except direct driving torque.

Fig. 1. Sketch of pump drive after change to high-speed Diesel, showing points of excess friction at A and B on pump, and thrust bearing on jack shaft



to see us at Tulsa!

9. BJ Surestop Tubing Catchers protect your tubing when running-in or coming-out, and while suspended in the well. The BJ Anchoring Method stops collar wear due to "tubing breathing" and provides more efficient operation of the pump.

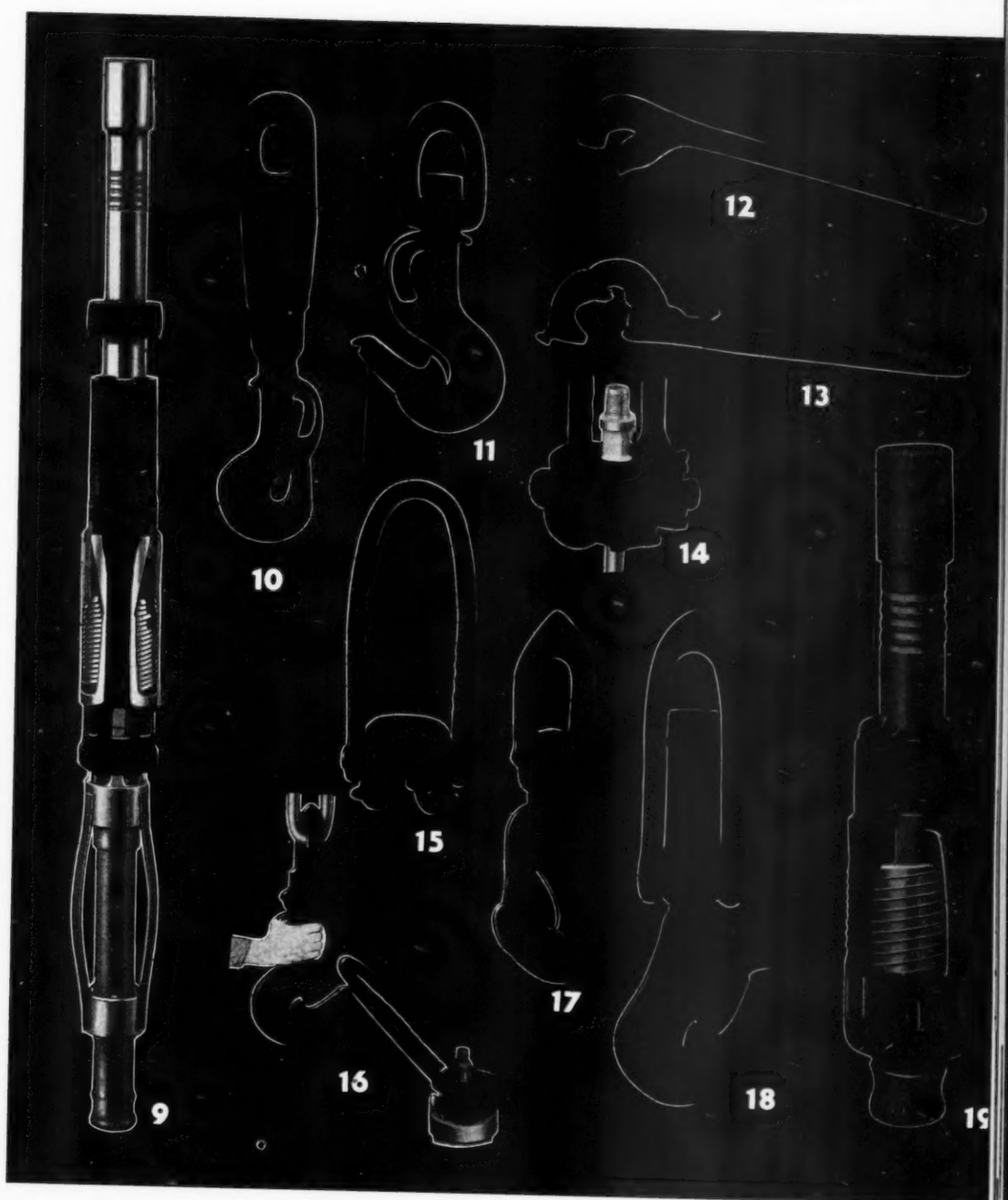
10. This BJ Rod Hook has an enclosed relief spring which lifts the section of rods being unscrewed without danger of "burring" the threads. Recommended for 20-ton loads of rods.

11. When open, the BJ Locking Arm serves as a guide for picking up the elevator bail — when closed it forms a C-link and adds greatly to strength of the hook.

12. This light weight Open End Tubing Tong is easy to handle; amply strong for ordinary work.

13. The BJ Snapon Tong encircles the tubing and locks in place. A back-up lever makes it possible to correct cross-threads without removing tong from tubing.

14. Each BJ Rod Elevator handles two sizes of rods and is equipped with both front and rear operating latches. Made in a Light and a Heavy Type, both of which are convenient to use and do not kink rods.



15. The BJ Full Circle Rod Elevator fits only one rod size, gives full diameter support, and will always suspend the rod in a true vertical and balanced position. It is fast in operation and a standard for safety.

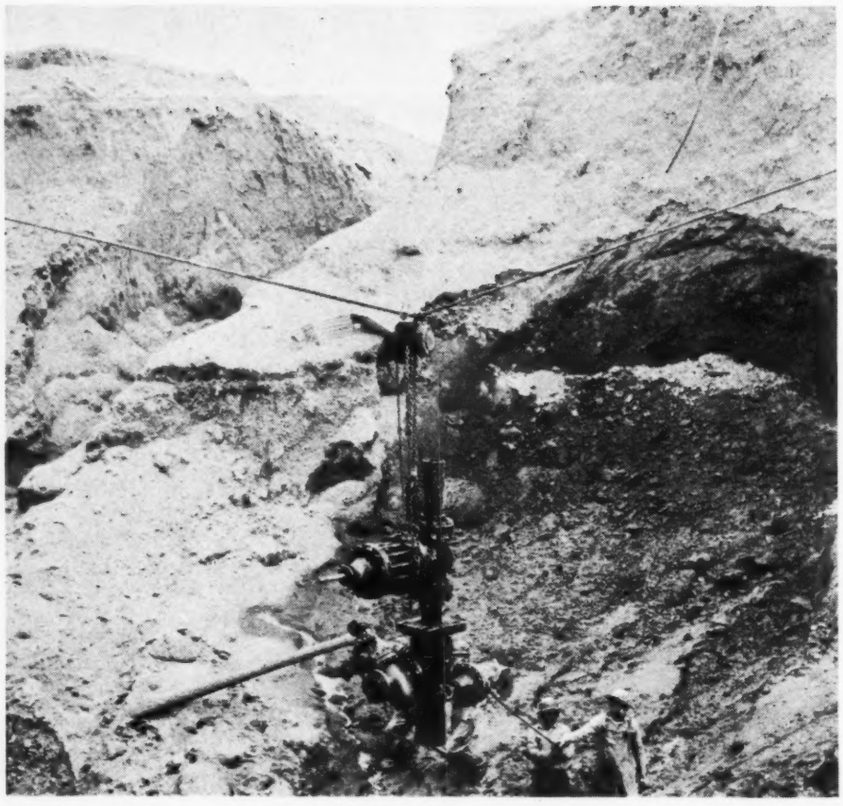
16. Here is a handy combination! See how the stops on the elevator hold the bail upright for an easy pick-up with the open "locking arm" of the BJ Rod Hook. Both of these are exclusive BJ features.

17. Since BJ offered three sizes of hooks designed exclusively for tubing work, hundreds of operators have junked old, make-shift equipment, and are now enjoying the convenience of BJ Tubing Hooks, with "Locking Arm Safety."

18. The BJ "75" Tubing Hook and the "30" (at left) and a third size for 50-ton loads (not illustrated) offer you a choice for every requirement.

19. Priced so low that any well now can afford tubing protection, the BJ Shortype C Tubing Catcher is rapidly being adopted by modern operators everywhere.

PRODUCTION TOOLS



The giant Christmas tree was swung into the yawning crater of the Davenport No. A-1 Swallow on a heavy steel cable suspended between a dragline on one side of the crater and a heavy tractor on the other. A chain hoist held the tree on its journey and while it was being lowered over the wild well

By
BRAD SMITH

Methods used to control the cratered well in the La Blanca field, Texas, burning since January 8th

Burning Gas Well Finally Brought Under Control

AFTER several days' effort, H. L. Patton and his crew succeeded in dropping a 20-ft. smokestack over the exposed casinghead of the burning Davenport A-1 Swallow in the La Blanca field. The smokestack was dropped over the casing to force the flames to burn higher, thereby reducing the temperature at the bottom of the crater where the men were working.

The crater was flooded with water from a nearby canal, the water being permitted to rise within five or six ft. of the top of the smokestack, some of it then being pumped out of the crater. The crew then raised the smokestack. When the gas began flowing through the water, it absorbed so much moisture that the fire, unable to burn the gas-water mixture, was extinguished immediately. The fire was first extinguished on February 18.

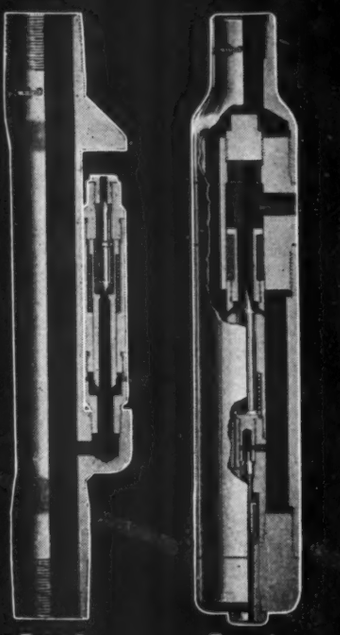
Patton then moved into the bottom of the crater his big 17-ton manifold. This piece of equipment consists of a conical, inverted swedge nipple at the lower end to guide the fitting into the casinghead. Above the nipple is a T, to which were attached flow-line

(Continued on Page 94)

The Christmas tree being lowered into place over the roaring well

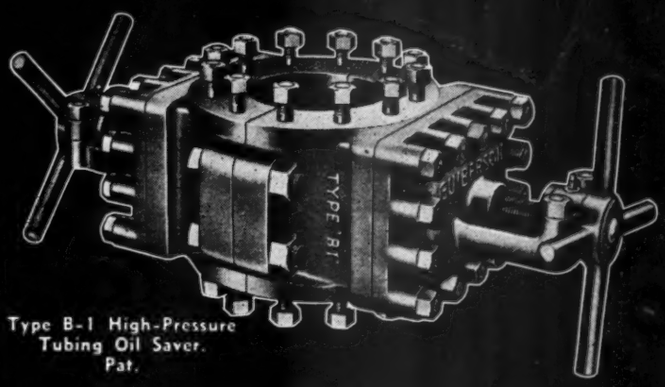
about them
eard about them

now SEE them
at the
TULSA SHOW
OKLAHOMA BUILDING
Booths 216-18, 233-35



Type B
Flow Valve.
Pat.

Type A
Intermitter Valve.
Pat. Pend.



Type B-1 High-Pressure
Tubing Oil Saver.
Pat.

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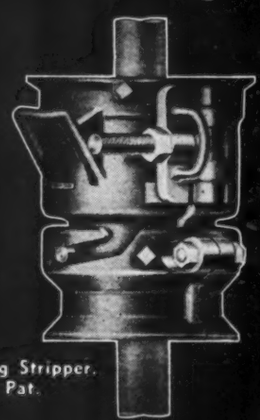
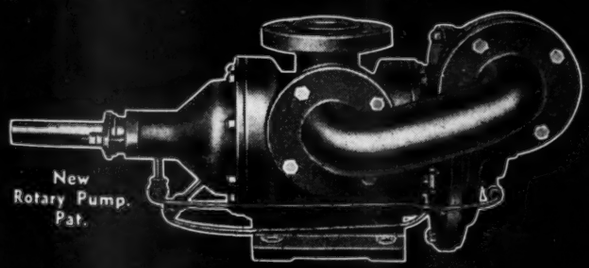


Tubing Stripper.
Pat.



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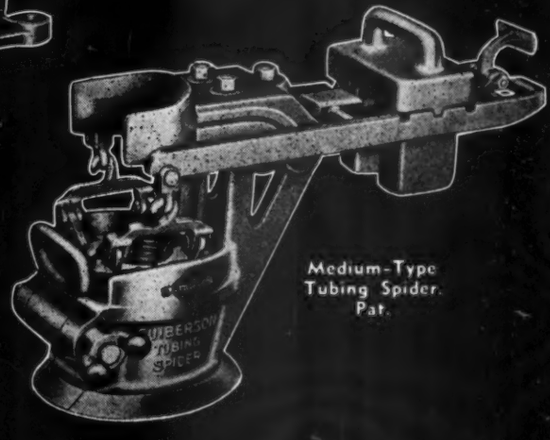


Medium-Type
Tubing Spider.
Pat.

ERSON

Close-up view of the Christmas tree, showing some of the flow-lines and the turnbuckles used to hold it in place. A second master valve later was tied to the top of the tree

(Continued from Page 90)

valves. Above the T is a 13-in. valve and above this an 8-in. valve. The entire fitting is topped by a smokestack. The equipment was mounted on the same skid that had formerly accommodated the small smokestack used before the fire was extinguished.

By means of a chain hoist, the crew began lowering the nipple into the casing. Cables were tied to the front and rear of the skids supporting the equipment, the cables leading from the crater to tractors and trucks. By slacking one cable and pulling the other, the skids could be moved across the crater floor to guide the swedge nipple into the casinghead.

On February 20 they succeeded in dropping the nipple into the casinghead, but a rough edge on the casing prevented the seat from closing tightly. Meanwhile the gas and distillate sprayed through the manifold about 20 ft. above the crater floor. The crew began closing the valves on the manifold, but when they were about one-third closed, gas jets appeared in various parts of the crater floor so the valves were opened to prevent further cratering. The jets were believed to indicate a leak in the casing below the surface of the ground; this belief was later substantiated.

On February 21 the crew was engaged in changing the position of the skids and manifold when a spark, generated when a cable slipped across an exposed piece of metal, ignited the column of gas and it again burst into flames.

On February 22, the crew returned to Houston and F. (Dee) Davenport, owner of the well, retained M. M. Kinley Company, also of Houston, to control the well. The Kinley crews arrived that day and started work.

After some preliminary work, Kinley exploded 30 qt. of nitroglycerine just above the base of the flames the afternoon of February 23. The flames disappeared for an instant, but the well ignited again from the heat of red-hot casing, drill pipe, and debris in the hole. When the well originally cratered on January 8, Osage Drilling Company, who drilled the well under contract, lost 9000 ft. of drill pipe from a nearby pipe-rack, all of which is in the crater.

Patton's manifold and derrick had been left in the hole when Kinley took over the job and this equipment had disappeared in a small crater that opened near the casinghead the day before Kinley first "shot" the well. Kinley spent two days cleaning debris from the hole and recovered Patton's manifold.

Kinley's second nitroglycerine blast, in which 45 qt. of the explosive were used, was detonated on February 25, and the flames were extinguished. He immediately flooded the crater with water to a depth of several feet to cool the ground.

Among the loose joints of pipe that Kinley took from the hole was another section of the 10-in. O.D. surface casing. The top of the surface casing was about 12 ft. below the crater floor, which caved so badly when Kinley's men attempted to locate and cement the casing that the job was delayed many hours.

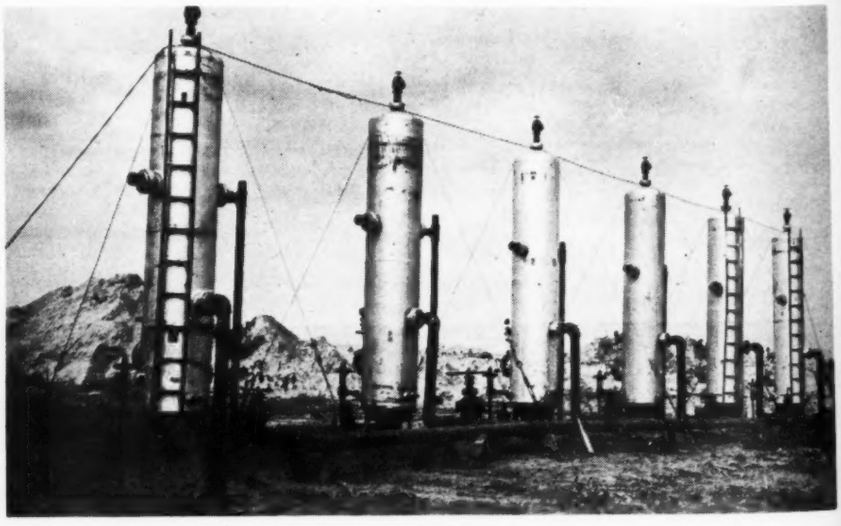
Kinley finally cleaned the hole around the 7-in. oil string and set a solid cement block around the top of the 10-in. surface pipe as well as the 7-in. oil string. He set in the cement four heavy steel "eyes", through which cable could be looped if necessary and to which the turnbuckles on the new Christmas tree were to be attached.

After completing much preliminary work, Kinley was ready to "stab" the new Christmas tree, weighing 6000 lb., over the 7-in. oil string. He stretched a section of 1⅛-in. steel cable across the crater from east to west. The east end was tied to a heavy oil-field truck, which in turn was lashed to a tractor-operated tree-dozer whose blade was buried deep in the ground. The west end was fastened to a heavy tractor. The hook of a chain hoist was fastened to the cable, and cable clips spaced about six in. apart held the hoist practically stationary on the cable. The lifting chain of the hoist was tied to the Christmas tree and the tree was dragged over the edge of the crater and started downward. Within a short time, it had been lowered to the crater floor.

On March 6 the tree was finally suspended directly over the casinghead and Kinley's crews spent six hours moving it from side to side and finally lowering it, with valves open, over the casing. The tree was fitted with three high-pressure valves to accommodate three flow-lines and was topped with a massive, specially-built hydraulic master valve. Thus, the well flow could be diverted through the flow-lines or released to atmosphere.

With the placing of the 6-ton gate valve, the crew had completed the job of bringing the well under control insofar as it was possible to do so.

Three separators, each capable of handling 6000 bbl. of fluid and 35,000,000 cu. ft. of gas per day were



The separator battery that handles the flow of the Davenport No. A-1 Swallow at La Blanca

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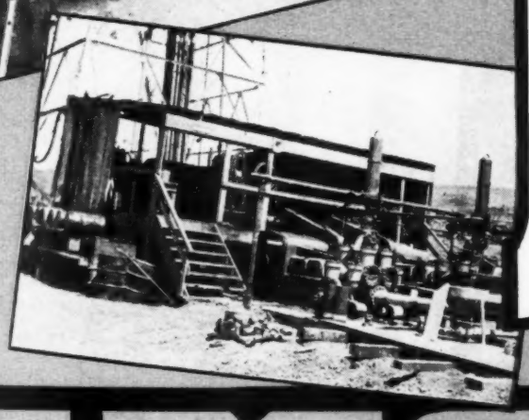

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set 150 ft. southwest of the well. This battery was later increased to six separators in order to remove as much fluid as possible from the high-pressure gas.

About 150 ft. south of the well, Davenport crews buried in the ground a 90-ft. manifold made of 10-in. casing with all joints and both ends welded. Four 4-in. flow-lines and one 3-in. flow-line from the casinghead of the well were welded into the manifold at various points along its length. To the opposite side of the manifold was welded a flow-line to each separator, each line being controlled by an individual 4-in. gate valve.

Near the center of the manifold a 10-in. master gate valve was installed to control flow of gas from the well. A by-pass of 4-in. pipe was welded into the manifold on both sides of the master valve for rapid opening of the manifold if operating difficulties arose. At the south end of the manifold and 300 ft. south of the well a flare made of 4-in. pipe rising 60 ft. into the air was constructed.

Of necessity, the installation permits the well to flow at all times, because oil field engineers who inspected the well were doubtful that it could be controlled.

Gas and distillate from the 7-in. casing enter the manifold at the north end. From the chamber in the manifold between the master valve and the end of the 10-in. casing, the gas is carried through the individual flow-lines to the separator battery. Four-inch gas lines from each separator converge into a 7-in. flow-line, which discharges into the other half of the manifold and thence through the flare into the air. Either the by-pass valve or the master gate valve on the manifold can be opened to divert the well flow directly to the flare in case of separator trouble, and the individual valves on each separator line provide additional protection to the separators.

Flowing pressure at the top of the 7-in. casing is about 350 pounds. The six separators and the flow-line and manifold system are designed to reduce the pressure and make it more easily controllable.

W. S. Parks of Weslaco, production superintendent for the Davenport interests in the Lower Rio Grande Valley, and Dan Tarbutton, Davenport drilling superintendent, were in charge of the Davenport crews assisting in fighting the wild well from the time it blew out. They were on the lease throughout the entire period and directed construction of the manifold, separators, flow-lines, and other installations.

Register immediately upon entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance

Bureau of Mines Analyzes Ramsey Pool, Payne County, Oklahoma, Crude Oil

THE crude oil produced from the discovery well in the new Ramsey Pool, Payne County, Oklahoma, is an intermediate base oil similar to that produced from the Wilcox sand in the Seminole, Oklahoma, area, according to an analysis by the U. S. Bureau of Mines Petroleum Experiment Station at Bartlesville, Oklahoma, maintained in coöperation with the State of Oklahoma. The gravity of the sample is approximately 43 deg. A.P.I. and the sulphur content 0.18 percent. The lighter fractions include 39 percent "gasoline and naphtha" and approximately 10 percent kerosene distillate. The remaining distillates, consisting of 28 percent gas oil and heavier distillates, give indications that the oil will yield approximately the same type of products as are obtained from Seminole crude oil.

Since the James Ramsey No. 1 well of the Mid-Continent Petroleum Corporation was completed in January, 1938, additional wells have been completed, and others are in process of completion. The discovery well has been reported as having a rated capacity of 13,500 bbl. of oil per day, a second producer is rated at 15,000 bbl., and a third well, No. 1 Columbia, is said to be the largest of the first three wells drilled in the pool. The wells are producing from Wilcox sand at depths of approximately 4800 feet. In addition to oil, the wells are producing large volumes of gas.

The analysis of the oil follows:

SAMPLE 38016
Ramsey Pool
Wilcox sand

James Ramsey Well No. 1 — Oklahoma,
4668-4795 feet — Payne County
Mid-Continent Petroleum Corp. — Sec. 18-18-2E Indian Meridian

GENERAL CHARACTERISTICS

Specific gravity, 0.811 — A.P.I. gravity, 43.0 deg.
Sulphur percent, 0.18 — Color, brownish green
Saybolt Universal viscosity at 77 deg. fahr., 37 sec.
Saybolt Universal viscosity at 100 deg. fahr., 36 sec.

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Dry distillation — Barometer 749 mm. — First drop: 26 deg. cent. (79 deg. fahr.)

Temperature, deg. cent.	*Percent cut*	*Sum, percent*	*Specific gravity of cut*	*Deg. A.P.I. of cut*	*Viscosity at 100 deg. fahr.*	*Cloud test deg. fahr.*	*Temperature deg. fahr.*
Up to 50	5.3	5.3	0.642	88.9	.....	.....	Up to 122
50— 75	3.6	8.9	.666	81.0	.....	.....	122—167
75—100	6.1	15.0	.711	67.5	.....	.....	167—212
100—125	7.2	22.2	.738	60.2	.....	.....	212—257
125—150	6.0	28.2	.759	54.9	.....	.....	257—302
150—175	5.8	34.0	.779	50.1	.....	.....	302—347
175—200	5.0	39.0	.796	46.3	.....	.....	347—392
200—225	4.9	43.9	.811	43.0	.....	.....	392—437
225—250	5.0	48.9	.824	40.2	.....	.....	437—482
250—275	6.0	54.9	.838	37.4	.....	.....	482—527
Vacuum distillation at 40 mm.							
Up to 200	4.5	4.5	0.850	35.0	41	15	Up to 392
200—225	4.4	8.9	.859	33.2	47	35	392—437
225—250	4.3	13.2	.870	31.1	58	50	437—482
250—275	4.5	17.7	.880	29.3	85	65	482—527
275—300	4.5	22.2	.889	27.7	150	85	527—572

Carbon residue of residuum 5.9 percent; carbon residue of crude 1.1 percent.

APPROXIMATE SUMMARY

	Percent	*Sp. gr.*	*Deg. A.P.I.*	*Viscosity*
Light gasoline	15.0	0.676	77.8	.....
Total gasoline and naphtha	39.0	0.731	62.1	.....
Kerosene distillate	9.9	.818	41.5	.....
Gas oil	14.0	.847	35.6	.....
Nonviscous lubricating distillate	8.5	.862-.882	32.7-28.9	50-100
Medium lubricating distillate	5.7	.882-.893	28.9-27.0	100-200
Viscous lubricating distillate	.....	.....	.....	Above 200
Residuum	18.2	.938	19.4	.....
Distillation loss	4.7	.....	.....	.....

Bleaching Clay

Part 8

The adsorption process in the vapor phase

By RAFAEL FUSSTEIG

As is well known, Gray[1] made the fundamental discovery that vapor-phase treatment of gasoline with adsorbents of the clay type resulted in the polymerization of the objectionable unsaturated hydrocarbons, and that this selective treatment would obviate the disadvantages of the sulphuric acid treatment then commonly used.

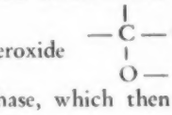
Different adsorbents have been reported to be suitable for use in vapor-phase refining, such as Fuller's earth, charcoal, boneblack, bauxite, aluminum hydroxide, and brown iron stone and other minerals that contain oxides of iron and are reduced before being used. Fuller's earth, however, has proved to be the best adsorbent material for use in vapor-phase refining and is used extensively. Fuller's earth has been used for the refining of relatively light petroleum products, especially cracked gasoline, in the vapor phase. As mentioned, objectionable di-olefines and other unstable hydrocarbons are polymerized to higher boiling compounds.

Before going into the details it will be well to review the chemistry of cracked distillates. In attempting to place the refining of cracked distillates on a systematic basis, various investigators have determined which types of compounds or fractions are chiefly responsible for those defects that refining is intended to remove. One of the earliest contributions was that of Smith and Cook[2], who showed that gummy deposits are caused by oxidation and have no direct relationship to quantity of unsaturates as determined by solubility in sulphuric acid. Cassar[3] has shown that olefine peroxides catalyze the formation of gum in unstable gasolines, that diolefines do not catalyze gum formation if they are free from peroxides, and that the gum content of a gasoline fraction bears no direct relationship either to boiling point or to sulphur content.

According to Flood, Hladky, and Edgar[4], straight chain olefines having a double bond at the end of the chain are more stable than those having the double bond in a cyclic hydrocarbon or tration being equal and structure similar, those of low molecular weight are the least stable. The presence of a double bond in a cyclic hydrocarbon or benzene ring causes compounds of this type to be less stable than the simple olefines, and a double bond adjacent to the ring involves extreme instability. Di-olefines as a class are much more unstable than mono-olefines, but the position of the double bonds is important in determining the stability. Conjugated double bonds introduce extreme instability, whereas a compound containing two widely separated double bonds is almost as stable as a mono-olefine. Cyclic di-olefines containing double bonds seem somewhat less stable than the comparable aliphatic di-olefines.

These compounds must be removed because they cause the formation of gum. Gums settle in storage tanks and in the motor carburetor, clog the fuel system, and form deposits on the hot parts of the engine, on the stems and seats of the inlet valves, in the intake manifold, etc., and often cause loss of anti-detonating properties of the gasoline.

The chemical nature of gum and the mechanism of its formation have not yet been thoroughly explained, but it is accepted by many investigators that the gum is a product of polymerization processes. The gum is primarily a product of the auto-oxidation of unsaturated hydrocarbons such as the di- and tri-olefines. The further result of this polymerization process is the chemical reaction between the polymerized di-olefines and the mono-olefines, resulting in the loss in anti-detonating properties of the gasoline.

The rate of gum formation is known to vary with the concentration of oxygen, temperature, quantity of deleterious foreign substances present, and length of exposure to light. The action of atmospheric oxidation on the olefinic bonds causes the formation of a peroxide  , in the first phase, which then changes into aldehydes, ketones, acids, etc. These compounds are able to polymerize and to react with the anti-detonating mono-olefines. It is therefore obvious that oxygen plays a very important part as a catalyst in the intermediary reactions of gum formation.

In other words, the complete absence of oxygen or oxygen compounds hinders the reactions causing gum formation.[5] It has been stated by the writer that when cracked gasoline was kept in tightly-closed containers it did not deteriorate to any appreciable extent but when the same material was exposed to air it darkened rapidly and soon deposited gums. The supposition of the writer is that the formation of gums involves not only the polymerization of the oxygenated compounds but also a direct polymerization of di-olefines.

Of course, these reactions occur only under suitable conditions. There are certain highly complicated hydrocarbons in cracked gasolines that act as catalysts in the polymerization of di-olefines. It seems that these catalysts are hydrocarbons containing a large proportion of carbon. This carbon has so many unsaturated linkages, and hence such a great affinity for di-olefines, that it is able to go into intermediary reaction with them. This reaction is similar to that of sulphuric acid with unsaturated hydrocarbons. The higher molecular and higher unsaturated hydrocarbons react in the first phase with one molecule of the di-olefine. In the second phase this combination reacts with a second molecule of the di-olefine or with a mono-olefine, and then the polymer and the higher molecular hydrocarbon separate.

These reactions reduce the yield and impair the quality of the gasoline because a great amount of the valuable anti-detonating olefines are removed by this polymerization. According to the writer, these higher molecular hydrocarbons should be removed in the first stage of the refining process; however, not all types of cracked gasoline contain these compounds that act as catalysts in the gum polymerization

of mono-olefines and di-olefines in the absence of oxygen. Their presence or absence depends on the kind of crude. Moreover, the conditions prevailing during the cracking process also influence the formation of gum with the aid of the above-mentioned catalysts. The writer has observed in a series of bottles filled with different types of gasoline that the gasoline produced in the liquid-vapor phase was free of these higher molecular hydrocarbons in contrast to gasoline produced in the liquid phase. A quite different behavior in the absence of air of gasoline produced by vapor-phase cracking was observed. A change of color was observed when the gasoline was allowed to stand several days, even in the absence of oxygen.

It has also been observed by the writer that gasoline produced from an oil high in unsaturated hydrocarbons showed a great amount of these unknown hydrocarbons, whereas oils high in saturated compounds yielded gasoline containing little or no polymerization catalyst. It seems, therefore, that unsaturated hydrocarbons may be split under certain cracking conditions into higher molecular hydrocarbons soluble in gasoline, these hydrocarbons then acting as catalysts in the formation of gum.

Therefore, these compounds must be removed before submitting the gasoline to the Gray process, in which di-olefines are polymerized by suitable adsorption clay. The equipment necessary for this process consists of one or more cylindrical tanks charged with Fuller's earth, which is supported on a false bottom in order to allow vapors and liquids to pass. These towers are well insulated to prevent the condensation of excessive amounts of gasoline. They are so connected that the vapors enter at the top of the clay tank and pass down through the clay layer where the polymerization takes place. It seems that the clay plays the role of the intermediary compound, like the sulphuric acid in the polymerization of olefines, that is, the microscopic channels in its interior enter into unstable chemical combination with a molecule of a di-olefine. In this state a second molecule of the di-olefine is able to react with the bound molecule of di-olefine, this polymerized di-olefine being instantaneously split from the surface of the microscopic channel.

This adsorption-polymerization phenomenon forms higher molecular hydrocarbons of high boiling range, which, on account of the difference in volatility, are separated from the gasoline vapors. Therefore, beneath the false bottom is a chamber in which the liquid drops out of the vapors and passes by gravity to a small tank, whence it may be pumped to any desired part of the system. The vapors leave through an outlet in the upper part of this chamber and should pass through a trap or small bubble tower so that any entrained polymers may be removed. The flow diagram, Fig. 1, shows this particular arrangement.

The process has produced a highly satisfactory refined gasoline from many different grades of cracking stocks by various cracking methods. This process in its present state of development gives good results using cracked gasolines from paraffin base or mixed base crude, but as yet it has not been particularly satisfactory for California cracked gasoline.

According to the writer, the reason for this is the presence of the hydrocarbons that act as catalysts in the formation of gum. These compounds cannot be removed by the action of an adsorbent. Only di-olefines are removed by the adsorbent material, the compounds that act as catalysts remaining unattacked and passing with the gasoline hydrocarbons to the cooling system. Because of the activity of these catalysts in polymerization of the unsaturated hydrocarbons during long storage of the gasoline, it is easy to understand that the quality of such gasolines will be decreased, in spite of the adsorption process with the aid of the clay that is used in the Gray system.

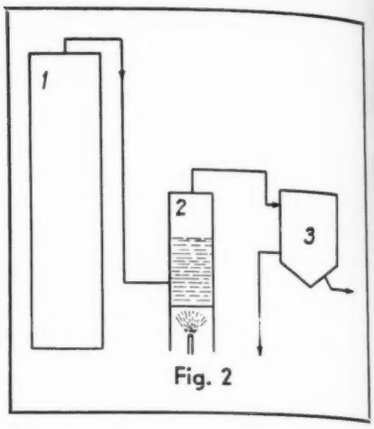
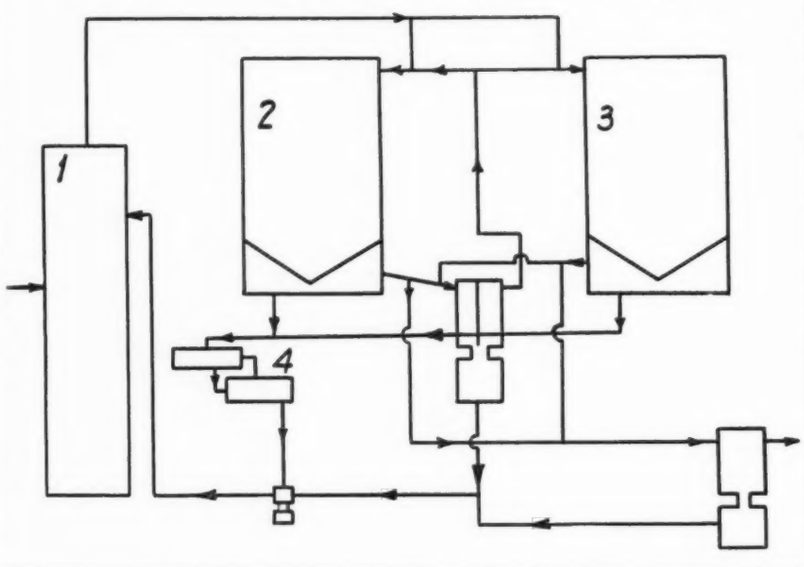


Fig. 2

To remove these impurities, the writer has carried out the following experiment: the cracked gas from the top of the fractionating tower, Fig. 2, was directed to a tower 2, which was filled with a lubricating oil of 3 to 4 deg. Engler viscosity at 100 deg. centigrade. To avoid solution of the gasoline vapors in the oil the oil was heated to a temperature of 300-350 deg. cent. by means of a burner placed under the tower. It has been observed by the writer that gasoline vapor after having passed through the oil was free of the higher molecular catalysts. Such a gasoline placed in a bottle and submitted to the action of sunlight in the absence of oxygen showed no change in color nor any deposition. It can be seen, therefore, that these higher unsaturated and higher molecular hydrocarbons were adsorbed by the oil.

The gasoline after the removal of the above-mentioned catalysts contains a quantity of di-olefines, which polymerize into gums. Therefore, the cracked gasoline vapors after leaving the adsorption tower 2 must be directed to the Gray tower 3, where the polymerization of the di-olefines takes place. Different adsorbents have been reported as being suitable for this purpose; however, the artificially-activated bleaching clay can not be used because, as discussed in a previous

Fig. 1. (1) Fractionating tower. (2) and (3) Clay towers. (4) Polymer



LOOK INSIDE

INTERNATIONAL PETROLEUM EXPOSITION . . TULSA, MAY 14-21

BOOTH 130 and 131
FLUID PACKED PUMP COMPANY

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article, even traces of the hydrochloric acid and aluminum chloride cause the formation of injurious hydrocarbons.

It has been established by the writer that hydrochloric acid or aluminum chloride in the sphere of action of a bleaching clay show characteristics quite different from those when alone. In the bleaching clay even traces of these agents cause a splitting of certain hydrocarbons to form an unknown compound, soluble in gasoline and acting as a catalyst in the formation of gum. Of course, this process is slow at first, but it is accelerated by the continuous formation of the compound.

This theory may be explained as follows: Certain unsaturated hydrocarbons may be split by the action of clay and hydrochloric acid or aluminum chloride into active unsaturated hydrocarbons, the hydrocarbons thus formed being able to react not only with the unsaturated compounds but with aromatic hydrocarbons as well. These reactions lead to polymerization and combination between unsaturated and aromatic hydrocarbons. Of course, these reactions reduce the anti-knock qualities of the gasoline, because the anti-knock unsaturated and aromatic hydrocarbons are removed as gum substances. We are therefore forced to conclude that only natural clays are suitable for the refining of cracked gasoline vapors in the Gray system.

The particular kind of natural clay to use is a problem for each refiner because of the difference in size of the microscopic channels of different clays. As discussed in the previous article, each size of microscopic channels is able to adsorb a certain type of hydrocarbons. The same phenomena occur in the adsorption-polymerization of gasoline vapors in the Gray process. Therefore, the proper clay must be found for each type of gasoline vapors, that is to say, for each type of cracking stock used and each type of operation. The size of clay grains also plays a very important part in the polymerization of di-olefine gases. A clay of 30-60 mesh was found to give the best results. The temperature of the vapor-phase treatment usually is only slightly above the dew point of the oil, i.e., the temperature required to maintain all the gasoline in the vapor phase. Remfry removes the impurities from gasoline[5] by passing the vapors through the adsorbent material at a temperature 18 to 36 deg. fahr. above the end point of the gasoline. In the Gray process the treating temperature is 350 to 400 deg. fahr., unless the distillation is conducted under pressure.

The consumption of the adsorbent material is decreased by the use of properly insulated towers. Truesdell[6] reports that with good insulation the consumption may be only one ton of Fuller's earth for 600 bbl. of cracked gasoline from Mid-Continent crude, whereas it may be as much as one ton for 275 bbl. of the same gasoline in uninsulated towers. For different types of gasoline the figures vary widely.

Adsorbents have also been recommended as catalysts in cracking and hydrogenation processes. Sabatier and Sanderman discovered several years ago that reduced nickel will cause hydrogen and ethylene to combine into ethane. This has developed into a general hydrogenation process. On the other hand, many investigators have stated in recent years that there are catalysts that accelerate the splitting of higher molecular hydrocarbons into lower molecular compounds. In reality these two processes show the same original reaction. To carry out the hydrogenation process, the molecule must be split into particles that are able to "absorb" the hydrogen atoms. The proper catalysts are able to do this. In the early days of scientific development of catalytic phenomena, Sabatier found that the best nickel catalyst may be produced by dissolving the metal in nitric acid, calcining the nitrate at a red heat, and then reducing the oxide at a temperature of 300 to 325 deg. cent. until water is no longer evolved. In other words, a greater surface of activity is developed by this procedure. The greater the surface exposed, the greater is the activity.

Frequently, in order to increase the surface of the catalyst it is mixed with some supporting material. Natural bleaching clay has been found to be the best material for this purpose. As is known, the bleaching clay possesses an immense number of microscopic channels, thus presenting a very great surface. It is very easy to understand that when a catalyst is mixed with Fuller's earth the activity of the catalyst will increase to a very great degree. In addition, the Fuller's earth itself also acts as a catalyst on account of its interior structure. It is seen from the above that the metallic catalyst has the greatest surface when mixed with clay; that is, when suspended in the interior of the microscopic and ultramicroscopic channels of the clay.

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Bureau of Mines Report of Investigations 3362, Properties of California Crude Oils: V—Additional Analyses, by E. C. Lane and E. L. Garton, may be obtained upon request, without charge, from the Information Division, Bureau of Mines, Washington, D. C.

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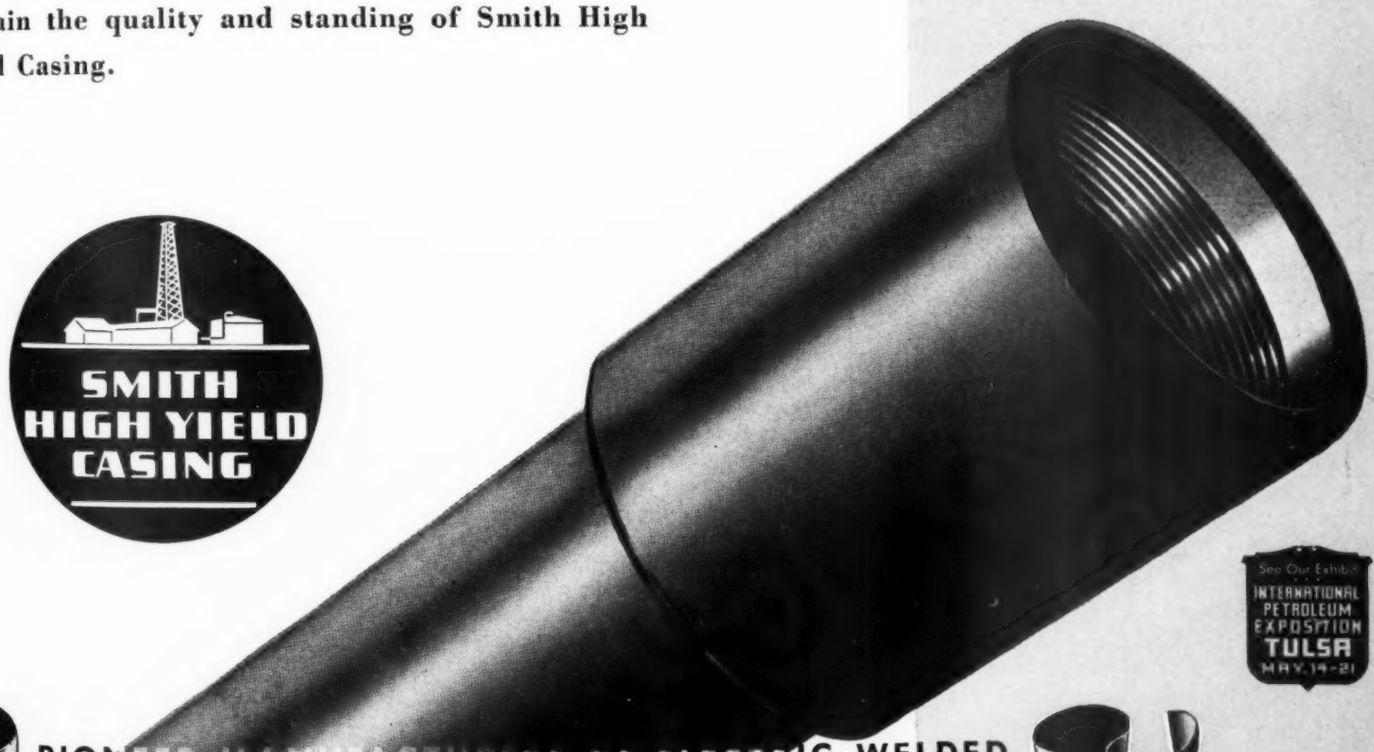

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Recent Advances in Knowledge of the Colloidal Properties of Clay Suspensions and Gels[a]

Part 3 (Concluded)

By CHARLES E. REED[b]

Effect of Electrolytes on Gelation

AMONG the more important factors affecting gelation rate, the effect of electrolytes is impressive. An 0.85 percent suspension of the finest particles of bentonite that have been freed of all exchangeable metallic cations by prolonged electrodialysis shows absolutely no observable trace of gel structure when allowed to remain undisturbed over a period of months, but upon addition of a small amount of concentrated KCl or KOH the same suspension will set almost immediately to a stiff gel. A few drops of concentrated mineral acid also suffices to produce a stiff gel.

It must be emphasized that gelation is independent of pH alone, for it is possible to produce gels of similar characteristics at any point on the pH scale by addition to the suspension of proper quantities of acids, bases or salts.

When hydrogen bentonite is treated with electrolytes, the setting time of the resulting gel does not become constant at once but gradually decreases to a final equilibrium value. During this same period the viscosity measured under any given conditions will also undergo an increase. Fig. 11 illustrates a case where the setting time became constant after 28 days. All the setting times reported in this paper were taken after 28 days except, of course, some of those in Fig. 11.

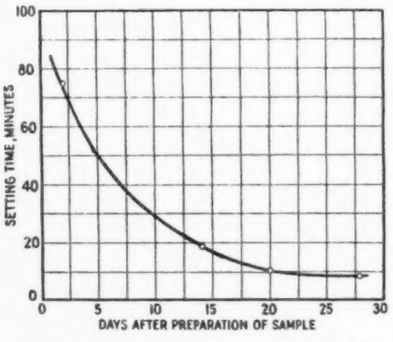

Fig. 11. Aging phenomena in a bentonite gel. Concentration of bentonite = 0.85 percent. Millimols KOH per liter of gel = 42.5, temp. = 25 deg. centigrade

While addition of a proper quantity of electrolyte to a hydrogen clay will effect gelation, addition of an excess amount will produce flocculation; that is, the particles will clump together in large masses and settle to the bottom of the container. Table 2 shows that the quantity of KOH required to effect flocculation increases impressively as the average equivalent spherical diameter of the particles decreases.

TABLE 2

Relation Between Flocculation and Average Equivalent Spherical Diameter

Fraction No.	Average Equivalent Spherical Diameter	Flocculation No. *(a)*
1	14.3	22-26
2	20.3	16-20
3	28.1	9-10
4	33.8	3-4
6	87.0	1-2

(a) The flocculation number of a given bentonite fraction is arbitrarily defined as the number of milliequivalents of KOH per gram of bentonite required to produce 5 mm. of sedimentation in 24 hours. Tests were conducted with 0.05 percent sols.

In general gelation is favored by ions of increasing valence. Often when a gel of given strength is produced by addition of a certain quantity of an alkali cation, it is found that the same result may be obtained by addition of a much smaller quantity of some large organic cation like that of tetraethyl ammonium hydroxide. While it is well recognized that many substances of high molecular weight and complex structure like tannin and sodium hexametaphosphate act to reduce viscosity and retard gelation rate, detailed work on such substances is largely unreported. No aspect of the subject offers more possibilities along with more complexities than the study of treating agents.

Effect of Temperature Upon Gelation

The effects of variation in temperature upon gelation and the mechanical properties of suspensions are so profound that they will be enumerated as several unusually important cases:

1. As shown in Fig. 12, the rate of gelation of potassium bentonite shows a great increase with increase in

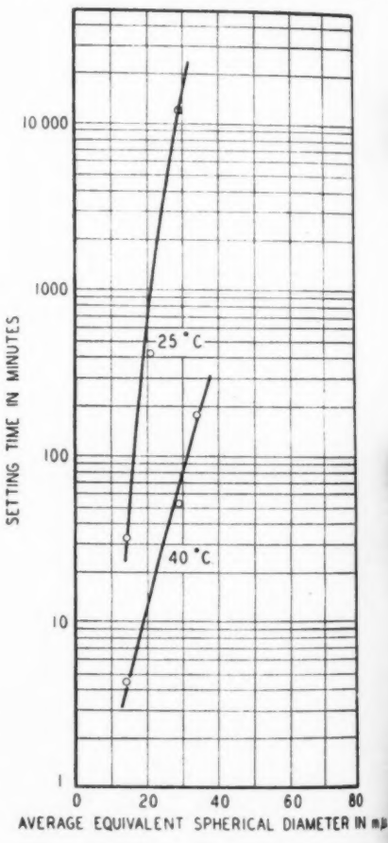

Fig. 12. Effect of particle size upon setting times at different temperatures. Concentration of bentonite = 0.85 percent. Millimols KOH per liter = 595

[a]Paper presented at Oklahoma City meeting, Petroleum Division, American Institute of Mining and Metallurgical Engineers, October, 1937.

[b]Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts.

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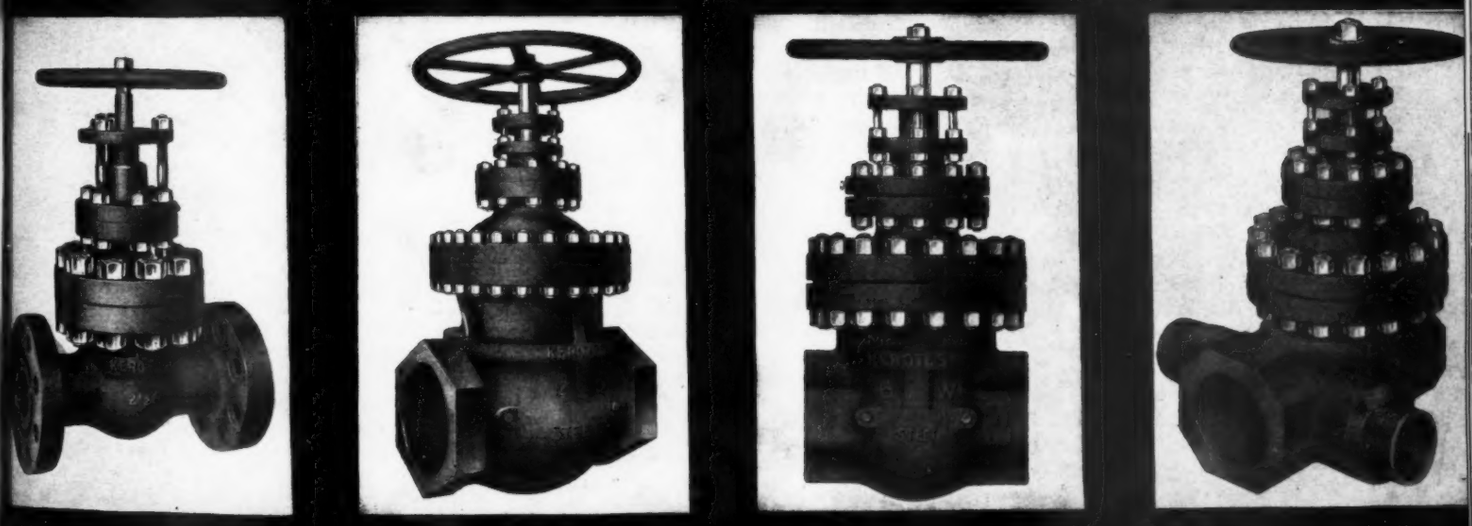
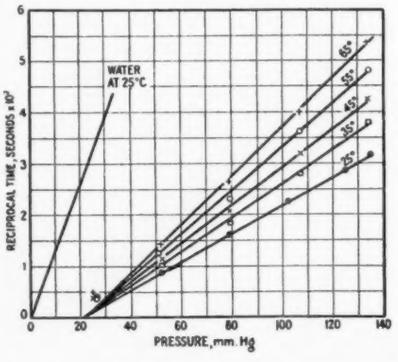


temperature and qualitatively there occurs a marked increase in viscosity upon heating. Furthermore, upon cooling, the rate of gelation does not fall to its original value but remains high, and the viscosity also remains high. Obviously the change in rate of gelation and viscosity on heating are largely irreversible, the extent of this irreversibility depending upon the time of heating at the higher temperature.

This irreversible increase in viscosity upon heating may well account for some of the thickening that often takes place while mud is in use, as often it becomes heated during passage through the well.

2. Fig. 13 represents data taken in a horizontal capillary-type viscosimeter and shows that hydrogen bentonite has an extrapolated yield point (intercept on pressure axis) independent of temperature and a mobility (slope of reciprocal time-pressure curve) roughly proportional to the fluidity of water. This behavior indicates no significant change in structure upon heating.

Fig. 13. Effect of temperature on flow properties of H-bentonite, fraction 6 (2.08 percent)



3. In contrast to 1 and 2, R. L. Dockendorff[1] has found that no noticeable effect occurs upon heating a suspension of natural bentonite containing sodium and potassium ions above the critical temperature of water, while heating a suspension of acid or hydrogen bentonite above the critical temperature of water effects complete flocculation.

It has been suggested that if a bentonite gel were to be heated sufficiently high, its rate of gelation would eventually decrease. This effect has not been observed to date in the laboratory. In one notable case a gel that took 48 hr. to set at 20 deg. cent. set in 5 sec. at 140 deg. centigrade. It is intended to investigate gelation rate at even higher temperatures, but there is some doubt as to the validity of comparing the results to those at lower temperatures, as deep-seated, irreversible changes may occur in the clay particle itself.

Gel Structure and the Mechanism of Gelation

All the facts set forth in preceding sections must serve as guiding lights in the formulation of any successful theory of gel structure. At the present time it is possible to offer convincing explanations of many of the most important facts, even though no theory has been developed in enough detail to permit satisfying explanations of all known facts.

It has been emphasized repeatedly that all investigators agree that gelation involves the production of a structure resistant to shear in which the ultimate particles are locked firmly into place. Disagreement occurs only when attempts are made to offer explanations as to how the particles are locked into place.

The earliest theory proposing to account for the gelation of clays was the so-called hydration or solvated-hull theory. The hydration theory assumes that the particles adsorb upon their surfaces thick layers of water in such a compressed and semifluid state that they may coalesce. When these water layers have grown to suitable thickness, coalescence may take place throughout the entire volume of the system, with the resulting immobilization of the particles that now find themselves locked into position in a gel.

The most impressive experimental evidence against the solvated-hull theory lies in the effect of temperature on gelation. There is abundant evidence throughout colloid chemistry to indicate that the solvation of a particle generally decreases enormously with an increase in temperature and acceptance of the solvated-hull theory would lead one to predict an increasing tendency toward gelation at the lower temperature, whereas actually exactly the opposite effect is observed.

Lewis, Squires, and Thompson[11] have proposed an essentially mechanical picture of the gelation process in clays. This theory focuses attention upon the platelike shape of the particles and assumes that as a result of innumerable almost exclusively edge-on collisions caused by Brownian movement the particles become wedged together in complete random orientation. The particles are conceived as being packed close enough so that movement of any one particle is prevented by mutual contact with its neighbors, this immobilization resulting in a gel structure.

To account for the appearance of gel structure on the basis of particle interference at a concentration of clay equal to 0.1 percent, the mechanical theory is forced to assume the existence of platelike particles with ratios of length and breadth to thickness of upwards of 1000 to 1. Although the layer lattice structure of clay indicates that these extremely platy particles could be stable and rigid, it must be remarked that there is no positive microscopic evidence that they have such extreme ratios of length to thickness as 1000 to 1. On the other hand, difficulties inherent in the present microscopic technique for accurate determination of size and shape of particles of colloidal size tends to weaken the weight of this evidence against the extreme dimensions postulated by the mechanical theory.

In order to explain the known facts without the assumption of extreme ratios of length to thickness, a third theory, which will be referred to as the attraction-repulsion theory, assumes the existence of two sets of forces between particles—a repulsive force of electrostatic nature resulting from the mutually repellent effect of the ions that dissociate from the surface and surround the particle, and an attractive force of the Van der Waals type.[2,3] These opposing sets of forces acting between particles vary in different manners with the distances between particles, particle size and shape, the concentration and type of electrolyte present, etc., and it is possible for the variations to be such that at one critical distance the attractive force will exactly balance the repulsive force. When two particles are separated by this critical distance there is no tendency for them to move, because when they approach closer than the critical distance the repulsive force increasing faster than the attractive force causes them to be repelled, while if they separate to a distance greater than the critical distance the attractive force increasing faster than the repulsive force causes a net attraction, which returns them to the critical distance of separation where all forces are balanced. Particles separated by this critical distance are thus effectively locked into place and a gel is formed.

The chief difference between the mechanical theory and the attraction-repulsion theory lies in the average distances assumed to exist between the particles in the gel. Both theories conceive a gel structure composed of particles locked into fixed positions in completely random orientation, but in the mechanical theory the platy particles are assumed to have a ratio of length to thickness great enough so that their edges are in mechanical

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contact, whereas in the repulsion-attraction theory the particles are assumed to be held in place by relatively long-range forces of attraction.

At present the mechanical theory offers eminently satisfactory explanations of the properties of concentrated clay gels like 40 percent kaolin, where extreme ratios of length to thickness do not have to be assumed to account for structure formation by particle interference. However, further experimentation will be necessary to establish which of these concepts is correct for gels occurring at the extremely dilute concentrations of clay of 0.1 percent or less.

The preceding theories have assumed that the ultimate platelike particle composed of a stack of crystallites is the structural unit in the gel. In contrast to this it is possible that the platy particles may undergo an oriented coagulation lapping over each other face to face, with the resultant formation of large platy aggregates, which act as structural units in the gel in the same manner as individual particles. Indeed, there is some evidence that a gel is composed of both primary particles and secondary platy aggregates.

In Fig. 14 are reported the results of several runs on 4.5 percent bentonite suspension in the MacMichael viscosimeter.[7] Since the whole plot is at 105 r.p.m., the deflection in degrees MacMichael may be taken as proportional to the viscosity measured at substantially constant rate of shear. Considering, for the moment, only that portion of the plot below a time of rotation of 70 min., three significant types of curves are obtained, depending upon the time after vigorous agitation that the suspension was allowed to set in the viscosimeter cup before rotation was begun. With zero initial set, the viscosity increases continually from a low to some asymptotic value, while with an intial set of 17 hr. the viscosity decreases continually from a high to some asymptotic value, which may well coincide with that reached in connection with zero initial set. Between these two limiting cases occur two runs of 15 min. and 1 hr. initial sets, respectively, in which the viscosity decreases from a relatively high initial value, goes through a minimum and begins to increase to asymptotic values, which again may well coincide with those in the limiting cases. The asymptotic values of deflection are those existing at the time when the gel structure has reached a state of dynamic equilibrium, the rate of breakdown due to rotation of the viscosimeter just balancing the rate of build-up produced by Brownian motion forcing particles into their positions of mutual interference.

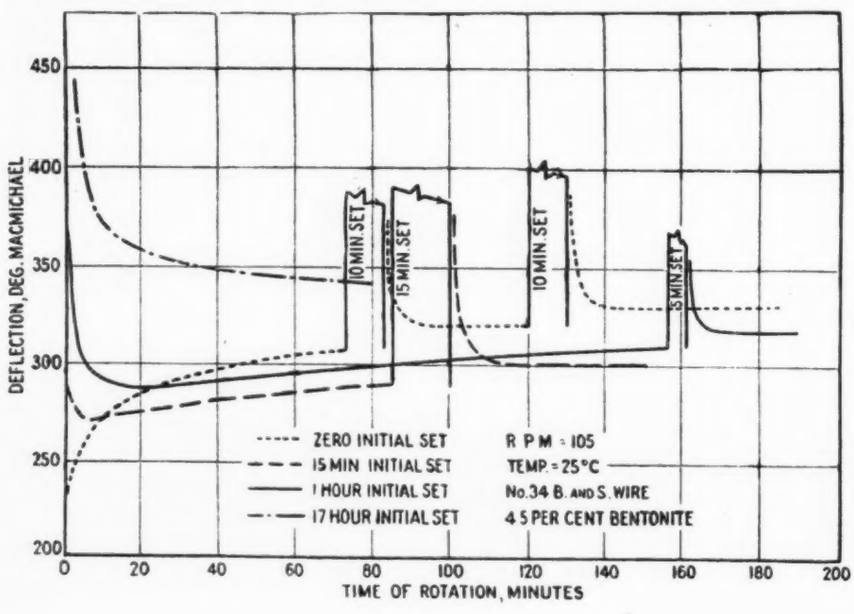
If it be assumed that the formation of a gel structure results from two different mechanisms working simultaneously, perhaps at rates varying with the time of rotation, the behavior in Fig. 14 becomes understandable.[12] In the case of zero initial set there was no structure built up at the start of rotation, the deflection being due entirely to the viscosity of the suspending liquid and the viscous drag of the suspended particles through the liquid. As time goes on a structure is built up by operation of both mechanisms, until finally at equilibrium the rate of breakdown becomes equal to the rate of build-up. In the 17-hr. initial set a structure of substantial strength has already been formed by the joint operation of both mechanisms, only to be broken down to an equilibrium value by rotation of the viscosimeter. In the intermediate set periods, the first mechanism contributing to structure has built up much of its portion of the structure and is now working slowly while the strength of the structure is being increased at a more rapid rate by the second mechanism. When rotation starts that portion of the structure produced by the second mechanism not having had time to reach sufficient strength is the first to be broken down, depressing the deflection to a low value, which recovers, however, because of the ever-continuing activity of the first mechanism.

While the nature of the two mechanisms is still in doubt, a most appealing suggestion is that the first mechanism consists of an oriented face to face coagulation of the individual clay particles resulting in secondary platy aggregates of increased ratios of length and breadth to thickness, and therefore of increased capacity for mechanical interference with each other.[10] The second mechanism consists of the wedging into place of both secondary aggregates and remaining unaggregated primary particles into the gel structure. Obviously, the more platy the particles, the more readily will the second mechanism occur; hence its effect in producing a structure undergoes increasing acceleration as the first mechanism continues to produce the desirable secondary aggregated particles of increased ratios of length and breadth to thickness. At the same time, it is easier to break up a secondary structure of aggregates than to break up the aggregates themselves or prevent their continuing formation, thus accounting for the minima in the curves of intermediate initial set.

Recent ultramicroscopic observations[5] where under some circumstances two distinct types of structure were noticed are additional evidence in favor of the two-mechanism formation of gel structure.

Both the mechanical and repulsion-attraction theories predict that decreasing particle size will increase the rate of gelation because of the enormous increase in Brownian movement caused by a decrease in particle size. In the mechanical theory increased Brownian movement causes an increase in rate at which the particles become wedged into place in the gel, whereas in the repulsion-attraction theory the particles have a greater chance to vibrate into the critical relative positions from which they have no tendency to depart because repul-

Fig. 14. Deflection versus time. Effect of initial and subsequent set periods



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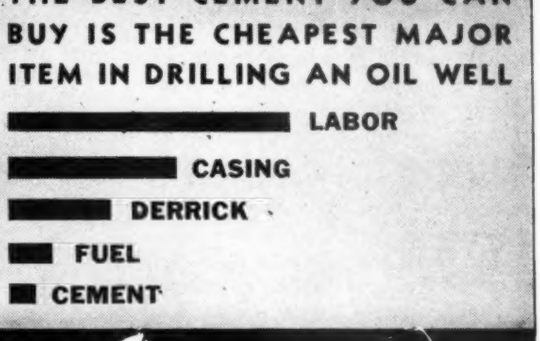

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sive and attractive forces are in balance.

Since rise in temperature increases Brownian motion, its effect upon increasing the rate of gelation is likewise predicted by both theories.

The explanation for the behavior of electrolytes, in brief, is that by modifying the extent of the dissociation of ions from the surface of the individual clay particles a profound change is effected in the magnitude and variation of the repulsive forces between particles. Also, owing to the change in thickness of the ionic atmospheres, a profound modification in interparticle friction is to be anticipated with a resultant change in the rate of gelation, ultimate gel strength, and viscosity.

Important Unsolved Problems of Clay Behavior

Measurement of Mechanical Properties of Clay Suspensions and Gels.—The viscosity, mobility, and yield point of a clay suspension are all complex functions of the rate of shear, the time of shear, and the past history of the suspension. Typical of the complications entering into any measurement of the flow properties of a clay suspension are those illustrated in Fig. 14, where, as has already been seen, the deflection (which is proportional to the viscosity at constant rate of shear) varies widely with the time of initial set before shear and with the time of shear. The effect of shearing history is further demonstrated by the intermediate periods of set during which the viscosity increases, to an amount depending upon the time of set.

Not only will viscosity, mobility, and yield point increase in an undisturbed suspension (thixotropy) but it is even possible to accelerate their increase by application of the proper type of mechanical agitation.[6] For example, a small tube of potassium bentonite allowed to stand undisturbed for an hour had set to a gel just strong enough to support its own weight upon inversion, no flow taking place down the walls of the tube. The same tube vigorously agitated until the suspension within it became a freely flowing sol was subjected to a gentle tapping motion, whereupon it set to a gel of the same strength in 50 sec., a seventy-five fold increase in gelation rate. This increase in gelation rate induced by mechanical action is called rheopexy.[6]

In the face of such complications it is not surprising that almost no progress has been made toward the quantitative characterization of flow properties of clay suspensions. Clearly, when it is constantly necessary to study the effect of different variables upon the sol-gel transformation where the only detectible differences are mechanical differences, it is important to develop methods of measurement which will distinguish between sol and gel in a precise, quantitative manner. Considerable research must continue upon methods of measurement in the future.

Electrochemical Behavior of Clay Suspension.—Recent work[5] has shown that the hydrogen-ion activity of suspensions of hydrogen clay measured by a glass electrode is independent of the particle size and is so great that on this basis alone hydrogen clay could be classed as an acid of far greater strength than would correspond to the ordinary chemical properties of the silicon and aluminum of which it is composed. On the other hand, the hydrogen-ion activity of a suspension of hydrogen clay calculated from its electrical conductance is, depending upon the particle size, only one fifth to one half as great as the electrometrically measured activity. Although the complete interpretation of this significant discrepancy, which increases as the particle size decreases, is as yet obscure, it should be remembered that while electrometric measurements are essentially equilibrium measurements involving no displacement of ions from the clay particles, conductometric measurements are essentially non-equilibrium measurements and involve a displacement of the ions from the particles. The lower value of hydrogen-ion activity obtained from conductance measurements may be additional evidence of the intensity with which the ions in the ionic atmosphere are bound to the clay particle. Additional research into the electrochemical behavior of clay cannot help but lead to a more complete knowledge of its structure.

Effects of Addition Agents.—With the exception of the simplest electrolytes whose behavior in the ionic atmosphere surrounding the clay particles is to some extent understood, knowledge of the effects of addition agents is entirely empirical. Such a lack of knowledge is understandable in view of the fact that to date it has been necessary to center all efforts upon acquiring a working picture of the structure of the clay particle and of clay sols and gels in order to have available a sound basis on which to interpret the effects of addition agents. In view of the profound effects which addition agents may exert upon the mechanical properties of suspensions and gels, it is certain that they will occur prominently in future research.

Conclusion

It is now recognized that the ultimate particles of clay consist of plate-like crystallites stacked upon each other like a pack of cards. The high swelling, high viscosity, and pronounced gelation tendencies of bentonite as contrasted with kaolinite are explained by the water molecules forcing their way between the crystallites and prying these apart with resultant formation of platy particles having unusual capacity to interfere with each other and with the flow of the liquid in which they are suspended. This interference of the particles may develop to such an extent that each particle is no longer free of its neighbors but requires a finite force to dislodge it from a position in the gel structure into which it has become locked. The data definitely indicate that those clay fractions consisting of the finest particles show the highest rate of gelation. Metallic clays are known to undergo an irreversible increase in viscosity and rate of gelation upon heating to moderate temperature levels as contrasted to hydrogen clays which show no significant changes in structure under the same circumstances.

The key to interpretation of these facts lies finally in recognition of the mechanism by means of which the ultimate platy particles become firmly locked into place in a structure. It is possible to account for the facts on the basis of mechanical interference of platy particles if the existence of very large ratios of length and breadth to thickness of the ultimate plates be assumed. Along with the mechanical interference theory it is necessary to recognize that the facts may be explained by the repulsion-attraction theory which instead of demanding the assumption of excessive ratios of length to thickness demands assumption of the existence of far-reaching forces of attraction and repulsion to bind the particles into equilibrium positions from which they have no tendency to depart. In the final analysis, the two theories differ only in the average distance they assume between particles in the gel and both are fruitful working theories at present. Final decision between the two theories, or perhaps their combination, will come only when we have more direct evidence of the dimensions of individual particles as well as the forces acting between these particles.

EDITOR'S NOTE: This is the concluding article of this series.

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5. E. A. Hauser and C. E. Reed: Paper de-

Where heavy muds are required to hold formation pressures, BAROID-AQUAGEL muds can be maintained at desired weights with lower viscosities than other muds of same weight.

High viscosity muds are often the cause of blowouts. This is because they gas-cut more readily than lower viscosity muds and because they produce a swabbing effect. When a mud gas-cuts, the mud weight is reduced and if enough of the mud in the hole is reduced in weight so that the total pressure in the hole is less than the formation pressure, a blowout is liable to occur. Straight BAROID-AQUAGEL muds will permit more solids to be picked up in the hole from drilling operations before prohibitive viscosities are reached.

If mud-making shales further increase viscosities, STABILITE —the ideal mud thinner—has proved itself invaluable both in reducing viscosities, in retarding gel-strengths and in freeing entrained gas even at elevated temperatures such as are encountered in deep holes. STABILITE is sold in 50-gallon drums or in powdered form in 10-pound cans. 100-pounds of powder is equivalent to a 50-gallon drum of liquid STABILITE.

BAROID Products tend to make Drilling Safer... Faster and More Economical!

See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY 14-21

A COMPLETE DRILLING MUD SERVICE

BAROID—Extra-Heavy Drilling Mud. AQUAGEL—Trouble-Proof Colloidal Drilling Mud. STABILITE —an Improved Chemical Mud Thinner. BAROCO—an Economical, Salt-Water Resisting Drilling Clay. FIBROTEX—For Preventing or Regaining Lost Circulation in Drilling Wells.

Stocks carried and Service Engineers available in all active oil fields

BAROID SALES DEPARTMENT

NATIONAL PIGMENTS & CHEMICAL DIVISION OF
NATIONAL LEAD COMPANY
BAROID SALES OFFICES • LOS ANGELES • TULSA • HOUSTON

livered at Fourteenth Colloid Symposium. *Jnl. Phys. Chem.* (1937) **41**, 911.

6. E. A. Hauser and C. E. Reed: *Jnl.* Amer. Chem. Soc. (1936) **58**, 1822.

7. M. E. Hitchcock: B. S. Thesis (Chem. Eng.) Mass. Inst. of Tech., May, 1937.

8. U. Hofman and W. Bilke: *Koll. Ztsch.* (1936) **77**, 246.

9. U. Hofman, K. Endell and D. Wilm: *Ztsch. Kristallog.* (1933) **86**, 238.

10. W. K. Lewis, L. Squires and W. I. Thompson: *Trans.* A.I.M.E. (1935) **114**, 38.

11. W. K. Lewis, L. Squires and W. I. Thompson: *Trans.* A.I.M.E. (1936) **118**, 1.

12. W. K. Lewis: Private communication, September, 1937.

13. C. E. Marshall: *Sci. Progress* (1935-36) **30**, 422.

14. C. E. Marshall: *Trans.* Faraday Soc. (1930) **26**, 173.

15. L. Squires and G. Broughton: *Jnl. Phys. Chem.* (1936) **40**, 1041.

16. L. Squires: Private communication, July, 1937.

17. T. Svedberg and Rinde: *Jnl.* Amer. Chem. Soc. (1923) **45**, 943.

18. W. I. Thompson: Sc.D. Thesis (Chem. Eng.) Mass. Inst. of Tech., June, 1937.

19. E. T. Wherry: *Amer. Mineralogist* (1925) **10**, 120.

20. W. P. Kelley, H. Jenny and S. M. Brown: *Soil Science* (April, 1936) 41.

THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending the Exposition. Register immediately on arrival.

Numerous Developments in Metallurgical Industry

WITH the close of 1937 United States Steel Corporation ended a decade of intensive research. During this period the widespread research and technical activities of its subsidiary companies functioned for the first time in conjunction with a central laboratory. Ten years ago Dr. John Johnston came down to Kearny, N. J., from Yale University to establish a central laboratory that would deal with major problems affecting all products made by subsidiary companies.

Research and development work in 174 laboratory departments throughout the corporation come under the direct supervision of Rufus E. Zimmerman, vice-president in charge of metallurgy and research. Grouped into 89 organizations in 64 laboratory buildings, these laboratories required an expenditure of some $8,400,000 in 1937.

Out of the work in Dr. Johnston's and subsidiary laboratories has emerged a more complete understanding of what happens to steel throughout the multiple steps in its manufacture. Scientific research into the fundamentals of steel making has made it possible to develop new products that are tougher, more ductile, and less corrodible. Practical results have already been demonstrated in the ability to make far better rails, lighter and stronger vehicles for transportation, and now a new tempering process gives much greater toughness and strength than was ever believed possible in plain carbon steel.

These and other developments are described in the following paragraphs.

Alpha and Gamma Iron

Solving the Dr. Jekyll and Mr. Hyde behavior of iron when under the influence of heat is regarded as an outstanding technical development to which research scientists of United States Steel Corporation subsidiaries made important practical contributions in 1937.

"Understanding this 'dual personality' of iron and learning to control it to the point of practical application justifies the prediction that America is entering a new era in the manufacture of steel in which man's most useful metal will be tailor-made for a wide variety of uses," according to Dr. Johnston.

As a result of the investigations, physical metallurgists know that the atomic structure of iron assumes two distinct forms controlling its propensity for dissolving carbon. Known as alpha and gamma iron, these two atomic arrays change from one to the other at a specific temperature as the iron is heated or cooled through the same temperature range.

By the proper control of conditions it is now possible to modify at will and with certain knowledge the internal structure and hence the final properties of the metal within a considerable range, correlating microscopic architecture with properties.

Creep

"Creep" deformation, or the slow continued stretching that metallic parts undergo when subjected to tension under high temperature, has received special study throughout 1937 by metallurgists of United States Steel subsidiaries.

Creep in steel products is motion so slow that it must be measured in millionths of an in. per in. per hour. Translated into longer distances, an object moving at this rate would take 13,704 years to move a foot, or 72,357,120 years to move a mile.

In their studies of this subject, U. S. Steel metallurgists have concluded that reliable data cannot be obtained unless the specimens are subjected to creep tests for a period of at least 3000 hours (approximately four and one-half months). Another innovation they have adopted is the use of Least Squares for analyzing the data obtained. They find that this method eliminates the "personal error" involved in graphical analysis.

The electric furnaces used for creep tests in the Kearny laboratory are of special design, embodying several unusual features. One of these is the automatic control of temperatures throughout the specimen within plus or minus 1 deg. fahrenheit. Another is the marking of the specimens with indicating lines in such a manner that both marks fall in the range of a single microscope, which is portable and can be attached to a pinion alongside each of 12 furnaces used for these tests. Sensitivity of the microscope has been increased to be consistent with other refinements of the test.

Results of the tests to date indicate that special methods of heat treatment may make it possible to improve the natural resistance of certain steels to creep. The problem is of importance in the manufacture of equipment subjected to stress at high temperatures.

Steam pipe lines and oil cracking stills made of steel, having an unduly high creep rate, may cause persistent operating difficulties or failures in service. Lack of knowledge of creep characteristics in certain steels now restrict pressures at high temperatures in such equipment, thereby placing an economic limit on the sizes to which oil cracking stills may be constructed. Studies of creep are being continued.

Austempering

Austempering, a method of heat treating that has been under investigation for a number of years, shows bright possibilities of imparting certain alloy-steel properties to ordinary carbon steel.

It is a process in which a steel product is cooled almost instantly from a point above its critical temperature to some lower level and held at substantially constant temperature depending upon the final characteristics desired, in a bath of molten salt or lead for a predetermined time period. This differs radically from the well-known quench and temper method and develops extraordinary ductility even at relative high hardness.

Tentative Program for Tenth International Petroleum Exposition

TULSA, OKLAHOMA
May 14-21, 1938

Pre-Exposition Events

Natural Gasoline Association of America, May 11-13.

National Oil Scouts Association, May 12-14.

International Petroleum Exposition

SATURDAY, MAY 14
REFINERS DAY

Directors for the Day: Clyde Alexander, R. H. Bartlett, Frank R. Billingslea, Allmand M. Blow, A. F. Bourne, W. M. Bovaird, A. E. Bradshaw, J. H. Brooks, D. E. Buchanan, J. Garfield Buell, E. J. Bullock, C. F. Camp.

In Honor of: Kansas, Arkansas; Winfield, Independence, Great Bend, El Dorado, Chanute, Topeka, Augusta, Neodesha, Hays, Hutchinson, McPherson, Wichita.

9:30 A.M. Exposition gates open.

10:00 A.M. Registration opens.—The Petroleum Engineer Building.

10:00 A.M. Hall of Science opens.—Guides provided.

2:00 P.M. Opening ceremony.

3:00 P.M. Registration of delegates from foreign countries.

4:00 P.M. Registration of "Old Timers" of the petroleum industry in replica of Old Drake Well, Exposition grounds.

6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.

7:30 P.M. Special showing in Hall of Science.

9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

SUNDAY, MAY 15
NATURAL GASOLINE DAY

Directors for the Day: Wm. L. Connelly, R. E. Day, R. O. Dietler, C. P. Dimit, Ray L. Dudley, George A. Dye, Dr. G. Egloff, R. S. Ellison, W. S. Farish, Harold B. Fell, E. R. Filley, W. S. Fitzpatrick.

In Honor of: Pennsylvania, Texas, Mississippi; Franklin, Titusville, Pittsburgh, Oil City, Bradford, Washington, Brownsville, Fort Worth, Amarillo, Pampa, Longview, Houston, Wichita Falls, Dallas, San Angelo, Sweetwater, Marshall, Eagle Pass, Midland, Tyler, Kilgore, San Antonio, Jackson.

9:30 A.M. Exposition gates open.

10:00 A.M. Registration opens.—The Petroleum Engineer Building.

10:00 A.M. Hall of Science opens.—Guides provided.

3:00 P.M. Ceremony dedicated to "Old Timers," Exposition grounds.

6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.

7:30 P.M. Special showing in Hall of Science.

9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

MONDAY, MAY 16
PRODUCTION AND PURCHASING DAY

Directors for the Day: J. P. Flanagan, Walter Fleming, C. W. Flint, H. V. Foster, Jacob France, Dr. C. K. Francis, Wirt Franklin, J. H. Gardner, Robert F. Garland, J. Burr Gibbons, Rush Greenslade, Henry Greis.

In Honor of: Oklahoma, Tennessee; Seminole, Ponca City, Wewoka, Okmulgee, Muskogee, Oklahoma City, Bartlesville, Guthrie, Claremore, Norman, Drumright, Ada, Glenpool, Cushing, Fairfax, Holdenville, Memphis.

9:30 A.M. Exposition gates open.

10:00 A.M. Registration opens.—The Petroleum Engineer Building.

10:00 A.M. Hall of Science opens.—Guides provided.

12:00 Noon Luncheons: Civitan Club, Alvin Hotel, Kiwanis Club, Mayo Hotel.

2:00 to 4:00 P.M. Junior Chamber of Commerce Young Oil Men's Trip through the Diamond D-X Refinery.

6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.

7:30 P.M. Special showing in Hall of Science.

8:00 P.M. Oil Show rodeo.

9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

TUESDAY, MAY 17
PIPE LINE DAY

Directors for the Day: L. S. Gregory, S. A. Guiberson, jr., P. D. Hayes, J. M. Hayner, Alf G. Heggem, J. H. Hill, Frank J. Hinderliter, B. E. Horrigan, Fred W. Insull, Roy B. Jones, A. J. Kerr, P. C. Lauinger.

In Honor of: California, Colorado, Louisiana; Santa Barbara, Long Beach, Bakersfield, San Francisco, Los Angeles, Coalinga, Fresno, Denver, Trinidad, Shreveport, Lafayette, Monroe, Baton Rouge.

9:30 A.M. Exposition gates open.

10:00 A.M. Registration opens.—The Petroleum Engineer Building.

10:00 A.M. Junior Chamber of Commerce, Young Oil Men's Day.

10:00 A.M. Hall of Science opens.—Guides provided.

12:00 Noon Luncheons: Junior Chamber of Commerce, Chamber of Commerce dining room; Traffic Club, Mayo Hotel.

12:00 Noon Junior Chamber of Commerce, Young Oil Men's luncheon, Chamber of Commerce dining room, fourth floor, Tulsa Building.

1:30 P.M. Trip to Beggs, Oklahoma, for seismograph demonstration through courtesy of Seismograph Corporation.

6:00 P.M. Dinner for foreign delegates.

6:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.

7:30 P.M. Special showing in Hall of Science.

8:00 P.M. Oil Show rodeo.

8:30 P.M. Junior Chamber of Commerce, Young Oil Men's Party.

9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

WEDNESDAY, MAY 18
MARKETERS DAY

Directors for the Day: John E. Mabee, Clarel B. Mapes, E. B. McFarlin, Joseph R. McGraw, D. F. McMahon, Chas. L. McMahon, Walter Miller, A. A. Moody, Ed. H. Moore, Wm. D. Moorer, C. Morris, W. J. Morris.

In Honor of: Utah, New Mexico, Wyoming; Salt Lake City, Santa Fe, Roswell, Albuquerque, Carlsbad, Sheridan, Casper, Newcastle, Lander, Gillette, Cheyenne, Gallup, Billings, Great Falls, Helena, Lewistown.

9:30 A.M. Exposition gates open.

10:00 A.M. Registration opens.—The Petroleum Engineer Building.

10:00 A.M. Hall of Science opens.—Guides provided.

12:00 Noon "Old Timers" Party.

12:00 Noon Luncheon for international delegates, sponsored by Rotary Club, Hotel Tulsa.

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

12:00 Noon Luncheons: American Business Club, Alvin Hotel; Coöperative Club, Chamber of Commerce; Engineers Club of Tulsa, Lions Club, Optimist Club.
6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.
7:30 P.M. Special showing in Hall of Science.
8:00 P.M. Oil Show rodeo.
9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

THURSDAY, MAY 19
DRILLING CONTRACTORS DAY

Directors for the Day: E. J. Nicklos, A. O. Olson, C. H. Pape, George Parker, F. B. Parriott, A. W. Peake, J. Edgar Pew, Henry L. Phillips, Waite Phillips, Warren C. Platt, Ralph B. Pringle, F. O. Prior.

In Honor of: West Virginia, New York; Charleston, Parkersburg, Huntington, Sistersville, Wheeling, Clarksburg, Olean, Olney, New York City.

9:30 A.M. Exposition gates open.
10:00 A.M. Registration opens.—The Petroleum Engineer Building.
10:00 A.M. Hall of Science opens.—Guides provided.
12:00 Noon Luncheons: Cosmopolitan Club, Hotel Tulsa; Hi-Twelve, Tulsa Geological Society.
12:00 Noon Safety Conference. Luncheon.
12:30 P.M. "Old Timers" luncheon at Exposition grounds, W. G. Skelly, host.
2:00 P.M. Awarding of medals to "Old Timers," Exposition grounds.
4:30 P.M. "Old Timers" Party.
6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.
8:00 P.M. Oil Show rodeo.
9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

FRIDAY, MAY 20
SAFETY ENGINEERS DAY

Directors for the Day: E. B. Reeser, Edward E. Robbins, Harry H. Rogers, C. F. Roeser, E. J. Sadler, Ed H. Salrin, J. H. Satterwhite, W. A. Schlueter, R. C. Sharp, J. S. Sidwell, W. G. Skelly.

In Honor of: Indiana, Ohio; Vincennes, Columbus, Marietta, Canton, Akron, Findlay.

8:00 A.M. Golf finals.
9:30 A.M. Exposition gates open.
9:30 A.M. to 4:30 P.M. First-aid contest.
10:00 A.M. Registration opens.—The Petroleum Engineer Building.
10:00 A.M. Hall of Science opens.—Guides provided.
12:00 Noon Luncheons: Chamber of Commerce, special Exposition program.
2:00 P.M. First-aid contest, demonstration, Exposition grounds.
6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.
7:30 P.M. First-aid meet banquet and awarding of medals.
7:30 P.M. Special showing in Hall of Science.
8:00 P.M. Oil Show rodeo.
9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

SATURDAY, MAY, 21
GENERAL OIL INDUSTRY DAY

Directors for the Day: Earl Sneed, Hugh Stalcup, O. C. Staples, Jay P. Walker, M. F. Waters, T. R. Weymouth, H. C. Weiss, Frank Wolfe, H. F. Worley.

In Honor of: Missouri, Illinois, Kentucky, Michigan; Joplin, Kansas City, St. Louis, Chicago, Effingham, Lawrenceville, Flora, Centralia, Casey, Robinson, Muskegon, Detroit, Mt. Pleasant, Flint, Big Rapids, Saginaw, Owensboro, Lexington, Bowling Green, Paducah, Ashland.

9:30 A.M. Exposition gates open.
10:00 A.M. Registration opens.—The Petroleum Engineer Building.
10:00 A.M. Hall of Science opens.—Guides provided.
6:00 to 8:00 P.M. Music in cafeteria by Larry Lee's Orchestra, of Radio Station WLW.
7:30 P.M. Special showing in Hall of Science.
8:00 P.M. Oil Show rodeo.
9:00 P.M. to 1:00 A.M. Music by Larry Lee in cafeteria.

Directory of Exhibits for International Petroleum Exposition

Hundreds of pieces of new and improved equipment used in the petroleum industry will be on display at the International Petroleum Exposition. These are described briefly in this directory, which it will pay you to read carefully in order to determine what exhibits it will benefit you most to see while in Tulsa. Engineers will be on hand at each exhibit to explain and demonstrate the operation of all products, a visual examination of which will be found eminently worthwhile

ACME FOUNDRY AND MACHINE COMPANY
Blackwell, Oklahoma
Coffeyville, Kansas

Booth No. 79 — Oklahoma Building

EXHIBIT: Hot oil pump plungers, liner castings, and Acmeloy metal will be shown.

Representatives: E. L. Graham, president; E. C. Graham, manager; E. D. Heckman, superintendent; and Harry Kessler, metallurgist.

•

AERO EXPLORATION COMPANY, INC.
Tulsa, Oklahoma

Booths Nos. 71 and 72
Scientific and Technical Building

EXHIBIT: Equipment on display will be aerial photographic equipment, and finished products of the company, including method of operation. Also, will display the "stereocomparagraph" and method of operation; and will have a movie in operation called "The Winged Camera" showing the production of the aerial photograph from the time the plane takes off to the finished product.

Representatives: Fred Q. Casler and Jack W. Quiggle.

•

THE AGANOX COMPANY, INC.
New Orleans, Louisiana

Booth No. 50
Scientific and Technical Building

EXHIBIT: Aganox, an organic colloid, which, when added directly to feed-water, gradually removes all scale and corrosion that may be in tubes, drums, heaters, water and steam lines, valves, pumps, turbines, and traps, and prevents the reforming of such scale and corrosior..

Representatives: E. R Smith and R. A. Lathrop.

•

AHLBERG BEARING COMPANY
Chicago, Illinois

Booth No. 32 — Texas Building

EXHIBIT: A new line of ball bearing pillow blocks will be featured. This equipment employs a new method of locking the bearing to the shaft. Also exhibited will be the Ahlberg Ground Bearings and the Ahlberg Master Ball Bearings.

Representatives: P. H. Staerk, manager Industrial Division, and O. K. Wright, Kansas City manager.

•

THE AIRETOOL MANUFACTURING COMPANY
Springfield, Ohio

Booth No. 41
Refiners and Marketers Building

EXHIBIT: Equipment on display will consist of Airetool super-powered motors with self-feeding cutter heads. The cutter heads

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. . . you are not "wild catting" your power requirements when you buy a Cummins Dependable Diesel . . . the proved diesel for oil field power on drilling rigs, pumps or generators.

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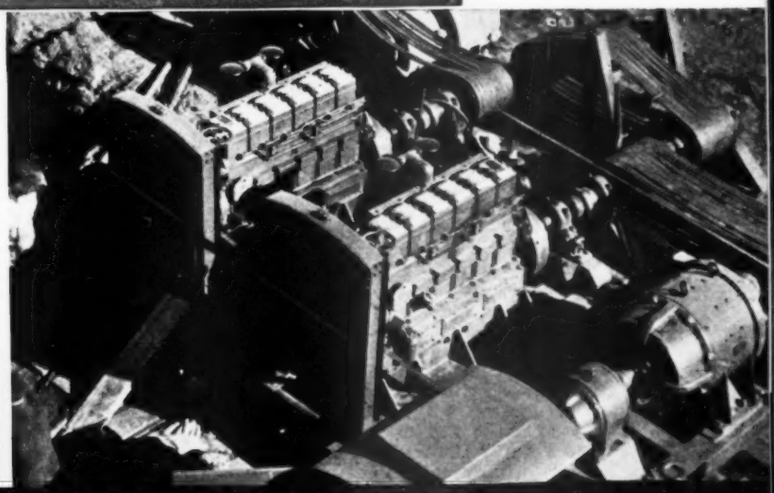

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SUPPLY CO.

REFINERY · PIPE LINE ·
OIL & GAS WELL SUPPLIES
General Offices Fort Worth, Texas

will be of both the single-expansion and the double-expansion types. For the small tubes, such as found in heat exchangers and condensers, Airetool will show the midget cleaners, which operate inside the tubes, and the large, powerfully-geared motor with its light aluminum case, which operates outside the tubes.

Representatives: R. E. Baker, Springfield, Ohio; L. D. Barnett, Jr., Houston, Texas; and Douglas Frazier, Tulsa, Oklahoma.

●

AIR-MAZE CORPORATION
Cleveland, Ohio

Booth No. 3
Scientific and Technical Building

EXHIBIT: Unimaze, Oil Bath, Multimaze, and Panel type filters suitable for oil-field applications.

Representative: A. D. Barr.

●

AIR REDUCTION SALES COMPANY
New York, New York

Booths Nos. 31, 32, and 33
Oklahoma Building

EXHIBIT: On display will be: Aircowelding; Airco portable pipe-cutting and beveling machine; Airco portable tensile and bend testing machine; Airco two-stage reduction oxygen and acetylene regulators; Stoody welding rods; Airco No. 10 Radiagraph; Yellow Jacket Electric Arc Welders; Flame hardening equipment; and Airco No. 4 Radiagraph.

Representatives: C. D'W. Gibson, vice-president, Air Reduction Company, Inc.; J. F. Pryor, vice-president, Magnolia-Airco Gas Products Company; J. J. Lincoln, jr., regional sales manager; H. W. Reade, apparatus sales manager; W. Mike Murphy; G. Van Alstyne, advertising manager; J. F. Callahan; A. N. Kugler; V. Forgett; D. Llewellyn; I. B. Yates, Wilson Welder and Metals Company, Inc.; E. C. Ackerman, National Carbide Corporation; D. F. McCandlish, manager, Oklahoma City; W. Whaley, assistant sales manager, Oklahoma City; R. R. Thompson; A. J. Vrooman, jr.; H. D. Kopper; M. F. Dunne; L. D. Sugg; H. T. Wadley, manager, Shreveport; and J. S. Stevens.

●

A. K. SUPPLY COMPANY
Tulsa, Oklahoma

Booth No. 43
Scientific and Technical Building

EXHIBIT: The following equipment will be on display: Mercoid automatic controls, temperature and pressure controls, including the new series DA-200 close differential control, Wheelco instruments, indicating pyrometers, pyrometer controllers, program controllers, portable instruments, and the Wheelco Flame-otrol, a combustion safeguard.

Representatives: Paul King and Hugh Acock.

●

ALLEN-BRADLEY COMPANY
Milwaukee, Wisconsin

Booths Nos. 21 and 79
Scientific and Technical Building

EXHIBIT: Primarily the apparatus exhibited and demonstrated will consist of electric motor starters, speed regulators, and accessories. The equipment will consist of manual, semi-automatic, and automatic types for a-c. and d-c. motors of sizes from a fractional hp. to several hundred horsepower. Included will be equipment for not only 600 volts and below but also high-tension motor starters for 2200 volts and above. An automatic reduced voltage synchronous motor starter also will be displayed, as well as several other smaller items in actual operation. The solenoid principle of design will be featured in the various assemblies of motor starters.

Not only will equipment be shown in the open types and standard enclosures but a considerable amount of weather-proof, corrosion-proof, and explosion-proof apparatus will also be on display.

Representative: A. K. Wolfe, sales engineer.

●

ALLIS-CHALMERS MANUFACTURING COMPANY
Milwaukee, Wisconsin

Block Q (outside)

EXHIBIT: Three types of power drilling rigs will be shown. One will be a full electric job, which by the use of internal combustion engines generates its own d. c. on location for operation of both the drawworks and slush pump motors. The second type will be a mechanical-electrical rig in which again d. c. is generated to operate the drawworks motor, but the engines drive the pump mechanically. The third rig is a complete mechanical job with the drawworks and the slush pump driven mechanically from the engines. In addition will be exhibited an Allis-Chalmers shaker for mud conditioning; explosion-proof a-c. motors for use in refineries and other hazardous atmospheres; texrope drive belts and pulleys; transformers for power line service; rotary air compressors for agitation work in refineries, etc.

Representatives: R. I. Moore, A. R. Knauss, K. P. Ribble, E. W. Burbank, A. Van Kampen, E. J. Kelley, G. deLaVergne, G. Forsyth, D. M. McCargar, and O. A. Haas.

●

THE LOUIS ALLIS COMPANY
Milwaukee, Wisconsin

Booths Nos. 53 and 54 **Oklahoma Building**

●

THE ALLSTEEL PRODUCTS MANUFACTURING COMPANY, INC.
Wichita, Kansas

Block F (outside)

EXHIBIT: Single drum rod and tubing hoists, single and double drum rotary and cable-tool drilling rigs, pneumatic-tired tractor servicing and exploratory core-drilling Mobilhoist unit, double drum unit with walking beam assembly, and Caterpillar tractor mounted pipe line sideboom and backfiller units will be shown.

Representatives: H. W. Cardwell, president; Arthur Harvey, sales manager; and the following sales representatives: H. W. Cardwell, Jr., Pampa, Texas; R. B. Chapin, Wichita, Kansas; R. B. Gilmour, Dallas, Texas; J. M. Crowe, Houston, Texas; B. J. Lorts, Topeka, Kansas; F. J. Olson, Los Angeles, California; D. W. Richardson, San Antonio and Corpus Christi, Texas; H. F. Ryan, Tulsa, Oklahoma; Mark T. Jordan, Shreveport, Louisiana; and H. E. Reece, Effingham, Illinois.

●

ALTEN'S FOUNDRY AND MACHINE WORKS
Lancaster, Ohio

Booth No. 40 **Kansas Building**

EXHIBIT: Display will consist of stop cocks, Essex pattern lock cocks, stuffing boxes, and casingheads. Will also exhibit a new automatic drip for taking water from gas lines.

Representatives: Henry A. Winland and Edward G. Sweeney.

●

AMERICAN AIR FILTER COMPANY
Louisville, Kentucky
See Hanlon-Waters, Inc., Exhibit

●

AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
Chicago, Illinois

Booths Nos. 17 and 18
Scientific and Technical Building

EXHIBIT: Communication equipment designed for the oil industry will be shown, including two models of the P-A-X (Private Automatic Exchange) system, the new desk-type Monophones, a portable demonstration cabinet containing typical working samples of automatic electric remote control devices, two new telephone call signals, explosion-resisting telephones, and a complete line of indoor types of Automatic-Sands substation protectors. In addition the company will provide telephone communication between the various buildings with a Private Automatic Exchange.

Representatives: C. H. Sim, Kansas City, Missouri; H. L. Housley, Dallas, Texas; D. K. Allen, Houston, Texas; and John S. Miller, Chicago, Illinois.

●

THE AMERICAN BRASS COMPANY
New York, New York

Booths Nos. 97, 98, and 99 **Kansas Building**

EXHIBIT: The central display will feature Anaconda condenser tubes made of Super-Nickel, Ambrac, Ambraloy, Admiralty Alloy, 70-30 Brass, Ambronze, Red Brass, Tobin Bronze, Muntz Metal, Arsenical Copper, and Deoxidized Copper. Duplex tubes also will be shown. Head plate materials will include Muntz Metal, Naval Bronze, and Admiralty Alloy. There will be separate displays of Anaconda welding rods, Anaconda copper tubes and fittings, Everdur silicon-bronze in the form of welded tanks and cast and wrought parts, and Beryllium Copper equipment.

●

AMERICAN CHAIN DIVISION OF AMERICAN CHAIN AND CABLE COMPANY, INC.
Bridgeport, Connecticut

Booths Nos. 173, 174, 175, and 176
Oklahoma Building

EXHIBIT: The following equipment will be on display:

Tru-Lay and Crescent wire ropes by American Cable Division.

Lay-Set and Non-Parel will be exhibited by Hazard Wire Rope Division.

American Chain Division will have on display various types of American chains as used in the oil fields.

Wright Manufacturing Division will have Wright hoists and trolleys on display.

In the American Chain Division booth a new item of equipment will be on display, which should be of great interest. It is called the Acco-Morrow Pressure Lubricator.

●

AMERICAN IRON AND MACHINE WORKS COMPANY
Oklahoma City, Oklahoma

Booths Nos. 51, 52, and 53
Oklahoma Building

EXHIBIT: The following equipment will be displayed: wall hooks, milling shoes, paraffin bits, female die nipples, tapered taps, forged-steel subs, rotary shoes, steam lubricator, rock bit cone fishing sockets, drill pipe float valves, fishtail bits, casing suspenders, automatic cathead, Simplomatic cathead, milling tools, flow packer, boltless hose coupling, releasing and circulating spear, release valve, safety packing flange, tie down companion flange, pump valves and seats, pumping well Christmas tree, sucker rod coupling and paraffin scraper, rocker arm for slush pump, improved type bradenhead, tubing support, geared suction hoist, drill pipe elevator, pump manifold valve, and automatic compound suction valve.

Representatives: J. F. Cailloux, president; Earl W. Miller, vice-president; John R. Riley, in charge of booth; M. G. McCool, P. K. Ridge, J. J. Fitzpatrick, G. C. Ross, and J. M. Taylor.

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.

AMERICAN-LA FRANCE AND FOAMITE INDUSTRIES, INC.
Elmira, New York

Booths No. 102 and 103 — **Texas Building**

EXHIBIT: A full line of fire extinguishing devices, with particular emphasis on those of special interest to the oil man. In addition to a complete exhibit of portable extinguishers, including Foamite, Alfite, Childs, and the Fire Gun (vaporizing liquid), this company's exhibit will feature foam-producing devices of the larger types such as the Model 350 Foamite Duomixer producing 4200 gal. of Firefoam per minute, and the single powder Foamite generators that produce from 500 to 2100 gal. of Firefoam per minute. Also on exhibit will be the newer Foamite Applicators. These towers, built of duralumin and stainless-steel tubing, with special lightweight alloy castings, are designed to allow introduction of Firefoam into tanks that are not equipped with permanently-installed foam delivery devices. As such they are necessarily extremely light and portable, but sufficiently rigid to allow their erection alongside high tankage under the worst possible conditions. Sectional cuts of the various extinguishers and extinguisher valves, including both types of the more common carbon dioxide extinguisher valves, the seated valve type and the frangible disc valve type, will be on display.

Representatives: James A. Harte, Tulsa, Oklahoma, sales engineer; and D. D. Fitzgerald, Houston, Texas, district manager.

●

AMERICAN LIQUID METER COMPANY
Alhambra, California

See Hanlon-Waters, Inc., Exhibit

●

AMERICAN LUBRICATOR COMPANY
Dallas, Texas

Booth No. 92 — **Kansas Building**

EXHIBIT: American "Standard" force and sight feed lubricators and American "Standard" force and sight feed chemical injectors.

Representatives: David L. Beatty and Roy Brundage.

●

AMERICAN MANUFACTURING COMPANY OF TEXAS
Fort Worth, Texas

Block 3 (outside)

EXHIBIT: The exhibit will include the following equipment: No. 16 jack, No. 18 jack, No. 15 jack, No. 19 jack, Type 903 counterbalance stroke post with hook-off built in, Type 904 stroke post with hook-off built in, No. 9 stroke post used as road crossings, No. 7 stroke posts used as road crossings, No. 4 holdover, No. 16 adjustable swing, No. 21 adjustable swing, Type 300-500, 4000-lb. PRC., 2-hp., double-reduction, twin-crank pumping unit, Type 356-555 25,000-lb. PRC., 71-hp., single-reduction, twin-crank pumping unit, driven by a Cooper-Bessemer Type GSD twin vertical engine; Type 302-505, 15,000-lb. PRC., 22-hp., double-reduction, twin-crank pumping unit, driven by an International Model 300 engine.

The rod line equipment will be connected to a Type 506, 35-hp., double-reduction reducer and it will be arranged to represent a typical 4-well hook-up. This equipment will be in operation, and will be driven by an electric motor. It will be arranged to illustrate the use of the various pieces of equipment used in rod-line pumping.

Representatives: W. H. Thompson, C. E. Medley, and E. F. Rankin.

●

AMERICAN METER COMPANY
Erie, Pennsylvania

See Westcott and Greis, Inc., Exhibit

AMERICAN OPTICAL COMPANY
Kansas City, Missouri

Booth No. 11

Scientific and Technical Building

EXHIBIT: Featured will be the company's line of equipment for the protection of head and eyes, including welding goggles, welding helmets, goggles for impact, dust, liquid splash, protection against glare, heat, in fact, a protective device for every head and eye hazard.

Representatives: R. A. Cox, Dallas, Texas; and W. G. Engel, Kansas City, Missouri.

●

AMERICAN RECORDING CHART COMPANY
Los Angeles, California

Booth No. 63

Scientific and Technical Building

●

AMERICAN ROLLER BEARING COMPANY
Pittsburgh, Pennsylvania

Booths Nos. 87 and 88 — **Oklahoma Building**

EXHIBIT: In addition to the standard line of bearings the company will show a radial bearing of the grooved inner-race type and also a bearing that in the past few years has proven very successful in slush-pump crossheads and wrist-pin applications.

Representatives: C. F. Succop, president; Carl L. Knaak, sales engineer; and Edward D. Maltby, Pacific Coast representative.

●

THE AMERICAN ROLLING MILL COMPANY
Middletown, Ohio

Booths Nos. 70 and 71 — **Oklahoma Building**

EXHIBIT: Products to be displayed include: (a) Armco spiral-welded pipe, a spiral electric butt welded pipe supplied in a wide range of diameters and wall thicknesses for gas gathering lines and transmission line; (b) Armco spiral-welded surface casing, a special light-weight surface pipe of standard O. D. sizes, supplied with either slip joint couplings or standard A. P. I. threaded ends and collars.

Representatives: R. E. Walker, Tulsa, Oklahoma, and T. J. Robinson, Houston, Texas.

●

THE AMERICAN SAND-BANUM COMPANY, INC.
New York, New York

Booth No. 101 — **Texas Building**

EXHIBIT: Sand-Banum, a colloidal concentrate, used to eliminate scale and corrosion from boilers, will be displayed. Also on display will be the Sand-Banum Blue Seal Emulsion. This product does the same for the cooling systems of internal combustion engines, gas compressors, condensers, etc., that Sand-Banum does for boilers.

Representatives: Frank J. Welu, of Houston, in charge; P. P. Elliott, M. T. Kappele, and L. Bradie.

●

AMERICAN STEEL DERRICK COMPANY
Tulsa, Oklahoma

Block 4(outside)

EXHIBIT: Will exhibit a typical American Derrick, 139 ft. high with a 10-ft. high interior type or removable-type drilling substructure. This derrick sub-structure is a typical Gulf Coast type. Also will show two self-contained pumping units. One unit will be a 20-hp. double-reduction gear unit and the other a single-reduction 51-hp. gear unit.

Representatives: Chas W. Flint, Roy Lundy, John F. Eaton, Harold G. Lewis, K. S. Flint, W. H. Lang, and Sam E. Loy, Jr.

●

AMERICAN ZINC INSTITUTE, INC.
New York, New York

Booth No. 6

Scientific and Technical Building

EXHIBIT: Display will consist of a presentation showing the selection and use of heavy-coated galvanized sheets. Some construction models also will be on display.

Representatives: George C. Bartells, Charles Matthews, and K. J. T. Ekblaw.

●

AMES BALDWIN WYOMING COMPANY
Parkersburg, West Virginia

Booth No. 3 — **California Building**

●

APPLETON ELECTRIC COMPANY
Chicago, Illinois

Booths Nos. 63 and 64

Refiners and Marketers Building

EXHIBIT: Display will consist of a complete line of malleable-iron explosion-proof junction boxes, pilot lights, plugs and receptacles, switches, lighting fixtures, panel boards, takeup reels, as well as wiring of all description, for hazardous and non-hazardous locations.

Representatives: R. V. Hawkins, district manager; N. A. Tornblom, chief engineer; and F. S. Donahue, district representative.

●

ARMSTRONG-BLUM MANUFACTURING COMPANY
Chicago, Illinois

Booths No. 222, 223, 228, and 229

Oklahoma Building

EXHIBIT: Will show full line of Marvel high-speed hack sawing machines, metal band sawing machine, automatic production saws, and non-breakable Marvel high-speed-edge hack saw blades in actual operation. The exhibit will include "the world's largest hack sawing machine," of 18-in. by 18-in. capacity.

Representatives: Harry J. Blum, Fred J. Blum, Jr., Allan M. Andrews, Earl R. Waddell, and Harry H. Knopke.

●

ARMSTRONG MACHINE WORKS
Three Rivers, Michigan

Booths Nos. 94 and 95 — **Texas Building**

EXHIBIT: A glass model of the Armstrong steam trap operating on 5-lb. steam whereby the cycle of operation can be clearly discerned. Also, a glass model of the Armstrong trap draining drips as applied to natural gas transmission lines.

Representatives: O. E. Ulrich, factory representative; T. H. Rea, sales manager; and George B. Allan, Oklahoma and Texas district representative.

●

ASBESTOS MANUFACTURING COMPANY
Huntington, Indiana

Booths Nos. 94 and 95 — **Oklahoma Building**

EXHIBIT: Amco woven industrial brake lining, molded friction blocks, and combination sets.

Representatives: H. D. LaMont, general manager, and Wilkes Campbell, sales manager, oil field materials division.

●

ATHEY TRUSS WHEEL COMPANY
Chicago, Illinois

Block D (outside)

EXHIBIT: A 30-ton Athey Forged-Trak combination log and oil-field wagon.

Representative: R. E. Pendleton.

●

ATLAS SUPPLY COMPANY
Muskogee, Oklahoma

Block H (outside)

EXHIBIT: On display will be Weber engines, both gas and Diesel, Weber Gold silencer, Foote Bros. gear reducers, Allsteel Products Company rig fronts and pumping units, Driftmeter radiator cooler, American Cable Company TruLay and Crescent lines, Kohler light plants, Myers water systems, Wheeling Steel Corporation and Pittsburgh Steel Company tubular goods, Jones sucker rods, Tnemec paints, and a general line of accessories.

Exhibited for the first time at the Exposi-

Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

THESE MEN GIVE YOU - STRAIGHT FACTS

If you want to get the "real low-down" on gun perforating, talk to the superintendents, the engineers and the men on the rig. They'll tell you what they expect of a gun perforator and why Lane-Wells equipment and service is universally preferred. They'll tell you that trained "gun crews" follow directions in every detail, that they shoot the job according to the operator's specifications, that they get on the rig and off the rig with the minimum amount of shut-down time. They'll tell you further that not only the Lane-Wells Gun Perforator itself, but the loads, conductor-core cable, electrical control devices, trucks,—in fact all service equipment,—are constructed and maintained with the highest degree of engineering skill. They'll remind you that Lane-Wells equipment and personnel will be where you want them, when you want them, ready to do the job as you want it done with but one thought in mind—the maximum results for the operator in minimum time.

TECHNICAL OIL FIELD SERVICES

Tomorrow's Tools Today

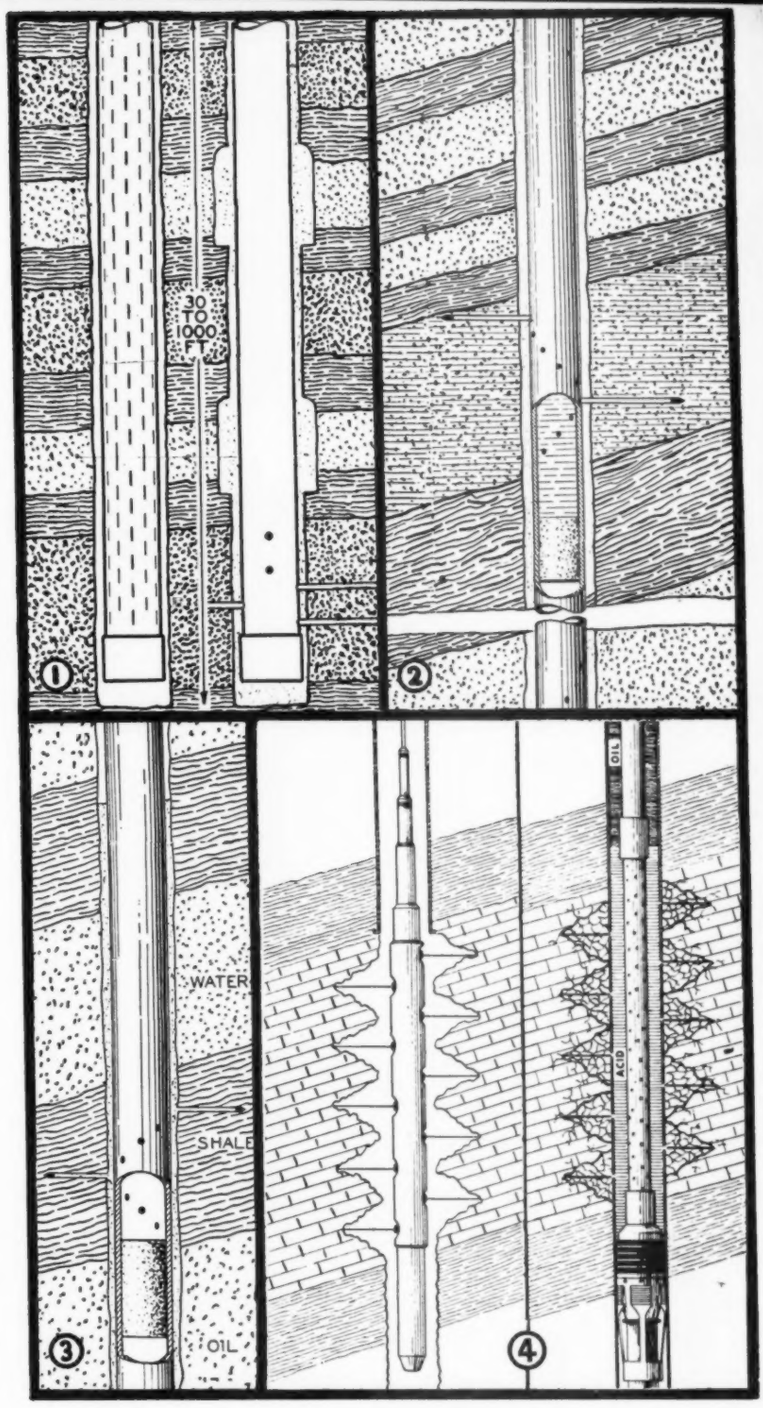
Lane-Wells Gun

4 ADVANTAGEOUS USES FOR

STRAIGHT

SAFE, ACCURATE *Gun Perforating.*

Out of the numerous applications for gun perforating these four stand out. Today more and more companies are finding it profitable to drill and case through the lowest known sand, gun perforate and after depleting this sand, plug back and perforate successively those sands which have been intentionally cased and cemented off. This use for gun perforating has now become more important than gun perforating's initial job of testing possible producing strata before abandoning a well. Lane-Wells technical service includes not only gun perforating but oil well survey, directional drilling, together with the manufacture of equipment necessary in this work. Lane-Wells Packers, Liner Hangers and Bridging Plugs are recognized throughout every world oil field for their efficiency, safety and economy.



1 *Cement Blank Liners in Wells* —Set your casing and cement it solid throughout the entire productive horizon. Then gun perforate and produce possible zones starting at bottom and working up.

2 *Before Abandoning Wells* —Before abandoning a well test all probable producing zones. Engineering records are usually available showing these zones and inexpensive gun testing programs justified.

3 *For Efficient Cement "Squeeze" Jobs* —For efficient cement "squeeze" jobs, on either water or gas conditions gun perforate. Perforating makes effective and positive shots.

4 *To Make Better Channels for Acid Treatment* —In perforating for acid treatment, holes can be placed immediately in the saturated zone for maximum efficiency and economy.

TECHNICAL OILFIELD SERVICES

Perforating

tion will be two new Weber engines; one a 7½-in. bore and 9-in. stroke, single-cylinder, 2-cycle vertical gas engine, complete with a radiator cooling system and operating an Atlas pumping unit. The other is a three-cylinder, 2-cycle, vertical Diesel engine of 7½-in. bore and 9-in. stroke, which is convertible to a gas engine. The single-cylinder engine is designed particularly for East Texas pumping requirements, and the three-cylinder engine is of a size suitable for operating geared pumping powers. Driftmeter Engine Coolers will be used with the larger engines.

Representatives: S. C. Maples and Bruce E. Gold, Tulsa, Oklahoma; Ed Robertson, Wichita, Kansas; F. E. Maxwell, Oklahoma City, Oklahoma; R. E. Howe, Muskogee, Oklahoma; H. U. Everett, Fort Worth, Texas; J. K. Brooks, Muskogee, Oklahoma; J. H. McDonald, Muskogee; and R. M. Carter.

●

AXELSON MANUFACTURING COMPANY
Los Angeles, California

Block 1 (outside)

EXHIBIT: Display will consist of interesting disclosures with respect to plungers, liners, seats and balls, and other kindred items, as well as pump assemblies.

Representatives: J. C. Axelson, D. M. Hammett, J. R. Walker, and others.

●

BAASH-ROSS TOOL COMPANY
Los Angeles, California

Booths Nos. 44 and 45 Texas Building

EXHIBIT: Will display a miscellaneous line of drilling and fishing tools.

Representatives: H. C. Ross, A. F. Brown, and G. F. Buckley.

●

BAILEY METER COMPANY
Cleveland, Ohio

Booth No. 47
Scientific and Technical Building

EXHIBIT: Display will consist of metering and automatic combustion control equipment, featuring the new Bailey Synchro-Meter. Bailey flow controllers, pressure, level, and temperature controllers, also will be on display.

Representative: C. E. Albert, district manager, Kansas City, Missouri.

●

BAIRD MANUFACTURING COMPANY
Tulsa, Oklahoma

Booth No. 8 Texas Drive (outside)

EXHIBIT: Will display well-pumping equipment, featuring in particular Fluid Seal check valves for oil-well pumps.

Representatives: L. D. Baird, president; and O. B. Leonard.

●

BAKER OIL TOOLS, INC.
Huntington Park, California

Booths Nos. 99, 100, 101, and 102
Oklahoma Building

EXHIBIT: A complete showing of the company's cement floating and guiding equipment, metal petal baskets, and the various combinations in which this is supplied. Also featured will be the Baker Cement Retainer, the Baker Wall Scraper, Wall Sampler, and the Baker portable kelly and pipe straightener. Of interest also will be a moving model showing the actual operation and results obtained with the Baker whirler float shoes and guide shoes, and results obtained with the Baker wash down whirler float shoes, and Baker wash down whirler guide shoes.

Representatives: R. C. Baker, president, Los Angeles, California; T. Sutter, Huntington Park, California, vice-president and general manager; C. E. Whitney, Houston, Texas, general sales manager; C. E. Burt, Huntington Park, chief engineer; G. M. Anderson, Huntington Park, district manager; P. V. McGivern, Tulsa, Oklahoma, district manager.

●

BALDWIN-DUCKWORTH CHAIN CORPORATION
Springfield, Massachusetts

Booths Nos. 9 and 10 Texas Building

EXHIBIT: Baldwin-Duckworth Chain Corporation, as in the past, will again show its newest developments in power transmission as applied to rotary drilling. On display will be the new "Master" series chain, designed particularly for hard, tough, deep drilling. The manufacturers state that this new chain has a minimum ultimate strength of 185,000 pounds.

In addition to the "Master" series chain, Baldwin-Duckworth will display the "Super Service" chain, the straight side bar chain that will not stretch; also the "Full Flex" series offset side bar chains designed for shallow drilling and for use where price is a factor. Baldwin-Duckworth "Master" and "Super Service" series chains are equipped with the Baldwin patented solid cotter that gives the full advantages of both riveted and detachable construction.

The Flexible Roller Chain Coupling, which allows as much as three degrees of permanent misalignment in the connected shafts without injury to itself, also will be shown. This coupling, using double-width chain, has barrel-shaped rollers in one strand and standard rollers in the other. Also on display will be a full line of single and multiple machine finished roller chains such as used on unitized rigs, pumps, and auxiliary drives on drilling rigs.

Representatives: George J. Fix, Sr., president, George J. Fix Company, Dallas, Texas, oil-field representatives for Baldwin-Duckworth Chain Corporation; and the following from the Fix organization: F. J. Weschler, general manager and treasurer; Hermann Klaucke, chief engineer; A. T. Arnold, advertising manager; George J. Fix, Jr., T. H. Lankford, and J. H. Turner, sales representatives.

●

BANTAM BEARINGS COMPANY
South Bend, Indiana

Booths Nos. 49 and 50 California Building

●

BAROID SALES DEPARTMENT
National Pigments and Chemical Division of National Lead Company
Los Angeles, California

Booths Nos. 123, 124, and 125
Oklahoma Building

EXHIBIT: In addition to the company's regular line of products, Aquagel, Baroid, Baroco, Fibrotex, Stabilite, and complete drilling mud testing equipment, will exhibit a new mud performance tester, designed for use in the field to determine the quality of mud.

The device is essentially a small filter press that operates at low pressure. The mud to be tested is placed in the cylinder and the pressure applied by means of water or compressed air, and maintained for a period of 30 minutes to three hours. The mud under pressure is forced through a filter paper placed in the bottom of the tester and the quantity of water passing through the filter paper during the time of the test is noted. When the test is completed, the tester is dismantled in a few seconds and the filter cake deposited upon the paper is inspected. This filter cake, together with the amount of water passing through the filter paper during the test, enables the operator to determine definitely the quality of his mud. By adding colloidal material, weight material, or chemicals to the mud he may determine whether or not the mud can be improved by such additions. This instrument gives the operator a definite means of controlling the quality of his mud to meet any conditions encountered during drilling, the makers state. Filter cakes and all data with reference to the performance of these testers will be available at the show.

Representatives: Geo. L. Ratcliffe, general manager; H. H. Farnham, Gulf Coast sales manager; D. A. Sikes, Mid-Continent sales manager; W. L. Heater, Pacific Coast sales manager; L. W. Huebel; D. H. Larsen; E. C. Myer; G. G. Bloxsom; R. W. Wilson; A. A. Roberts; G. C. Wahlstrom; A. C. Cramer; D. D. Varnell; and P. S. Andrews.

●

THE BASTIAN-BLESSING COMPANY
Chicago, Illinois

Booths Nos. 36 and 37 Oklahoma Building

EXHIBIT: Rego high-pressure oxygen and acetylene discharging manifolds, high-pressure regulators, low-pressure regulators, welding and cutting torches, and valves. A production welding operation will be conducted continuously throughout the hours of the show. A daily contest will be conducted for visitors at the Rego booth. Each visitor will have an opportunity of estimating the total number of parts welded daily and the nearest estimate each day will be given an award.

Representatives: Earl M. Evleth, M. J. LaDue, and E. L. Mills.

●

BEAUMONT IRON WORKS COMPANY
Beaumont, Texas
See Frick-Reid Supply Corporation Exhibit

●

BEAVER PIPE TOOLS, INC.
Warren, Ohio

Booths Nos. 42 and 43 Oklahoma Building

EXHIBIT: The entire modernized line of Beaver tools will be on display, but the center of attraction will be the Model-A Beaver Pipe Machine, a portable unit that threads in the machine ⅛ to 2 in., but will also drive auxiliary tools up to and including 12 inch. It is a combination cutting, threading, and bolt machine.

Representatives: C. W. Smith, Dallas, Texas, oil-field district manager; William S. Andrews, Chicago district manager; and C. W. Shafer, general superintendent.

●

BECK ENGINEERING COMBUSTION COMPANY
St. Louis, Missouri

Booth No. 4 Oklahoma Building

●

BENJAMIN ELECTRIC MANUFACTURING COMPANY
Des Plaines, Illinois

Booths Nos. 23, 24, and 25
Refiners and Marketers Building

EXHIBIT: Service station floodlights and other lighting equipment: Service-Lite, explosion-proof lighting equipment, lighting fixtures for refineries and bulk stations, Vapolets and other lighting equipment for derricks and field locations, industrial signals, and signaling devices for pipe lines.

Representatives: H. R. Heitzman, and C. B. Harlow, vice-president, central division.

●

BETHLEHEM STEEL COMPANY, INC.
Bethlehem, Pennsylvania

Booths Nos. 83, 84, 85, 126, 127, and 128
Oklahoma Building

EXHIBIT: A display showing the manufacture of sucker rods from ore to finished product; small wire rope making machines in actual operation; a motion picture showing the essential operations in the manufacture of wire and wire rope. Equipment on display will include oil-country tubular goods, drop forgings, tool joints, and pump liners.

The miniature models of high-speed wire

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

When the going gets tough.....

The Sizmo Drill » Available in two popular types . . . the Standard, operated in the conventional core drill method and the popular Kelly type, a combined rotary method with hydraulic feed.

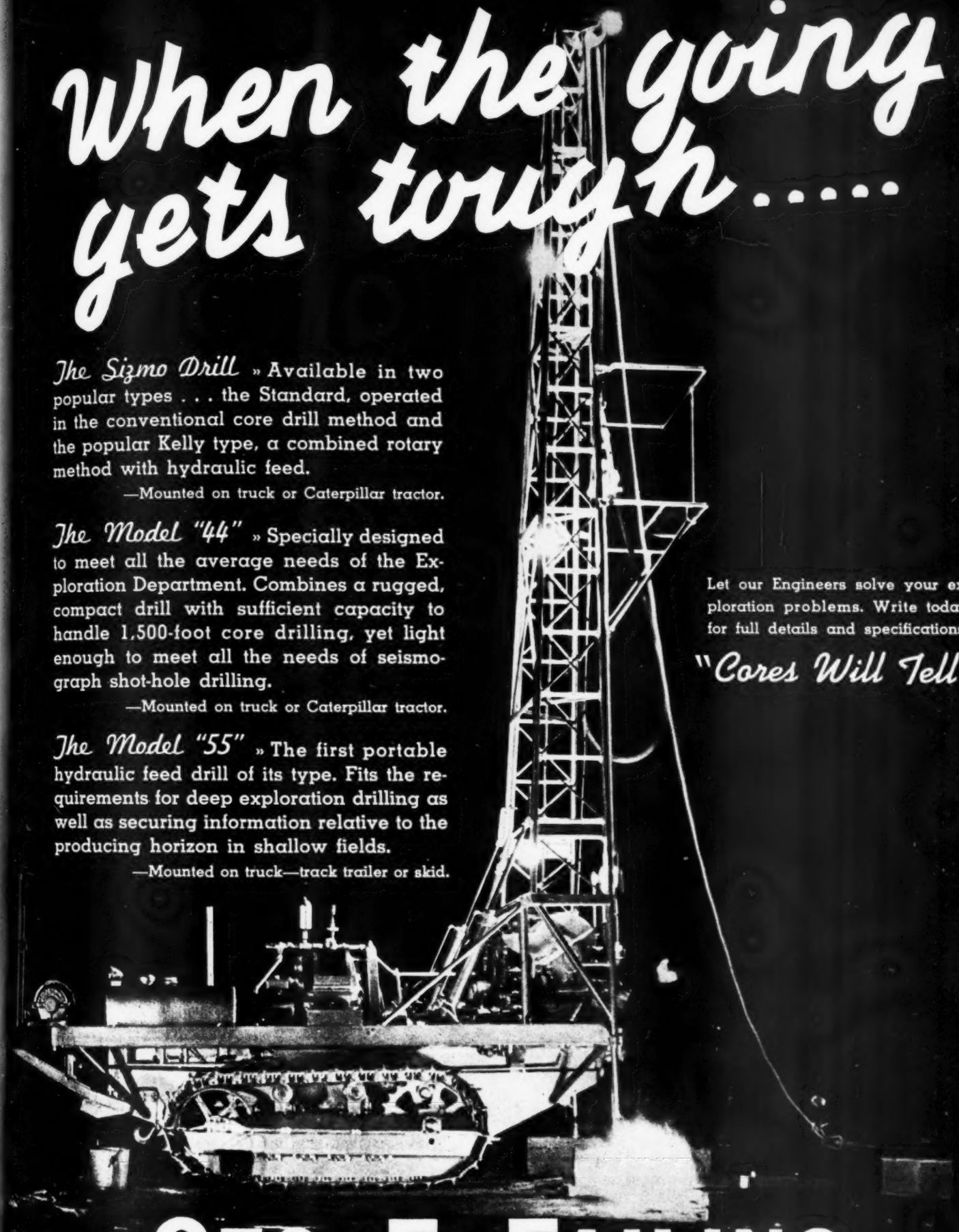
—Mounted on truck or Caterpillar tractor.

The Model "44" » Specially designed to meet all the average needs of the Exploration Department. Combines a rugged, compact drill with sufficient capacity to handle 1,500-foot core drilling, yet light enough to meet all the needs of seismograph shot-hole drilling.

—Mounted on truck or Caterpillar tractor.

The Model "55" » The first portable hydraulic feed drill of its type. Fits the requirements for deep exploration drilling as well as securing information relative to the producing horizon in shallow fields.

—Mounted on truck—track trailer or skid.



Let our Engineers solve your exploration problems. Write today for full details and specifications.

"Cores Will Tell"

GEO. E. FAILING
SUPPLY COMPANY

ENID, OKLA. • HOUSTON, TEXAS

rope making machines go one step further than most so-called working models because they actually work. A miniature strander and closer will make zinc coated strand and 3/32-in. wire rope right before the spectators' eyes.

W. E. Sommerville of Coal City, Illinois, who developed the high-speed rope machines now employed in the Bethlehem Steel Company's Williamsport Plant, built the models as a spare time hobby back in the early 1930s. In order to avoid breakdowns or excessive wear in operation he found it necessary to make many of the parts heavier, such as gears and shafts, than called for in a design carried out exactly to the scale of the larger machines of which they are copies.

Just as throughout the years the standard machines of which these are copies have been perfected and improved as accumulated operating experience has suggested so also from time to time have these models been further improved and perfected. In some instances the improvements that have been incorporated correspond to innovations that have been introduced in the design of standard machines, and in other instances operating difficulties have been solved that are inherent in the diminutiveness of their size or the fine gauge wire they utilize. The wire employed in the strander is .010 in. in diameter or about the size of wire used in house screens or fly swatters. The slender 3/32-in rope produced at the exhibits will in effect be of top-notch Bethlehem Purple Strand quality, and will even have the purple strand in it that identifies this brand.

Representative: A. A. Warg.

●

BETHLEHEM SUPPLY CORPORATION
Tulsa, Oklahoma

See Bethlehem Steel Corporation Exhibit

●

BIG THREE WELDING EQUIPMENT COMPANY, INC.
Houston, Texas

Booths Nos. 201, 202, 249, and 250
Oklahoma Building

EXHIBIT: The following is a brief description of the equipment that will be on display:

Lincoln electric-motor-driven shield-arc SAE welder, stationary and portable.

Lincoln gas-driven shield-arc SAE welder, stationary and portable.

Lincoln Diesel-engine-driven shield-arc SAE welder, stationary and portable.

Various welding electrodes and sample tests, manufactured by Lincoln Electric Company.

The "Linconditioner" air-conditioner for arc-welding fumes.

Black and Decker portable electric tools designed to operate on arc-welding machines.

Lincoln arc-welding supplies and accessories.

A 200-amp. Lincoln welding generator coupled to a steam turbine to be used as a welding unit by drilling contractors using steam-driven tools.

Representatives: B. K. Smith, president, Houston, Texas; C. K. Rickel, vice-president, Fort Worth, Texas; R. L. Looney, divisional manager, Tulsa, Oklahoma; O. L. Rogers, assistant division manager, Tulsa; C. R. Wilson, consulting engineer, Tulsa; F. J. Rickel, representative, Tulsa; C. F. Bowen, office manager, Oklahoma City, Oklahoma; and A. F. Davis, vice-president Lincoln Electric Company, Cleveland, Ohio.

●

THE BLACK & DECKER MANUFACTURING COMPANY
Towson, Maryland

Booths Nos. 20 and 86
Scientific and Technical Building

EXHIBIT: The equipment displayed will consist of Universal and High Cycle portable electric tools and their accessories, including drills, grinders, sanders, valve refacers, and reamers.

Representatives: Robert D. Black, sales manager; W. L. Poynter, manager of the Kansas City branch, and E. V. Schaub, manager of the Dallas branch.

●

BLACK, SIVALLS & BRYSON, INC.
Oklahoma City, Oklahoma

Booths Nos. 39, 40, 41, 64, 65, and 66
California Building

EXHIBIT: Oil and gas separators, treating equipment, and tanks.

Representatives: A. H. Black, Glenn Skinner, Allan J. Edwards, G. E. Peoples, G. Raymond, E. E. Carter, Donald Torr, and Verne Palmer.

●

THE BOVAIRD SUPPLY COMPANY
Tulsa, Oklahoma

Block No. 1 (outside)

EXHIBIT: Will exhibit a number of the major items distributed by the company. The featured ones will be:

The company's own manufactured line of surface pumping equipment (straight-lift jacks, stroke posts, swings, knock-offs, and a complete line of back-crank equipment). Also, a new oil-less bearing that is adaptable to various lines of equipment, principally pumping jacks, swings, etc.

Bovaird Grip Tubing Spiders and Bovaird Split Slip Type tubing elevators.

Pacific and Oil States pumps.

Lamtex and Howe casing pumps.

Dempster water-well working heads, centrifugal pumps, both regular fitted and bronze fitted, with stainless steel shaft.

Cushman gas-gasoline engines.

Century Electric motors.

Other leading lines of equipment on display are as follows:

S. M. Jones Company: Jones sucker and pull rods.

Hazard Wire Rope Company: Lay-Set and Nonpareil oil-country wire rope.

Spang Chalfant, Inc.: Tubular products.

National Tube Company: Tubular products.

Republic Steel Corporation: Tubular products.

Hughes Tool Company: Tool joints and rock bits.

Reed Roller Bit Company: Tool joints and rock bits.

Imperial Belting Company: O & G oil-country belting.

Walworth Company: Valves, fittings, etc.

The Fairbanks Company: Fairbanks valves.

Byron Jackson Company: New type sucker rod elevator and new type tubing catcher; tubing and casing tongs.

Republic Rubber Company: Excello oil-country belting and mechanical rubber goods.

E. M. Smith Company: Grizzly Cub and Grizzly Powerflex rotary hose and Grizzly brake band lining.

Representatives: Exhibit will be in charge of S. J. Raphel, sales manager, assisted by A. C. Stensgaard, Tulsa city salesman. The following officers, store managers, and field men will be in attendance: W. M. Bovaird, president; F. D. Bovaird, vice-president; D. D. Bovaird, treasurer; R. M. McMahan, secretary; Clyde Stapleton; F. J. Robbins; J. B. Hubbard; C. A. Black; R. E. Batchelor; W. J. Miller; C. V. Dennis, jr.; R. W. Robbins; V. P. McAnally; R. E. Whitten; D. C. Kennedy; George R. French; James P. Tune; F. V. Strong; R. J. Evans, jr.; W. H. Sherin; Charles Meyers; D. M. Bradley; D. D. Bowersock; D. C. Osmer; E. B. Snell; C. E. Reynolds; and C. W. Henry. The following representatives of the Lamtex Equipment Corporation also will be present: B. A. Brennan, chairman of the board; W. Fred Cox, president; F. T. (Joe) Pipkin, vice-president; Herschel Lewis, assistant secretary; R. F. Mackin, field salesman; Roy Reedy, field salesman; Henry Maples, field salesman; and C. C. Moore, field salesman.

●

BOYNTON ENGINEERING CORPORATION
San Antonio, Texas

Booths Nos. 75 and 76
Scientific and Technical Building

●

BRADEN WINCH COMPANY
Tulsa, Oklahoma

Booth No. 15
Kansas Building

EXHIBIT: Truck winches to be displayed will include: Braden All-Steel Model 91-C, rated at 100,000 lb.; All-Steel Model 41, rated at 40,000 lb.; new All-Steel Model C-4, rated at 20,000 lb.; All-Steel Model B-2C, rated at 15,000 lb.; and new Model A-2, rated at 12,000 pounds. Winch parts also will be shown.

Representatives: T. J. Schuetz, president; Fred Medlin, salesman; Warren Emmons, engineer; and Paul Lindley, salesman.

●

BRIDGEPORT BRASS COMPANY
Bridgeport, Connecticut

Booths Nos. 22 and 23
Texas Building

●

THE BRIDGEPORT MACHINE COMPANY
Wichita, Kansas

Block 5 (outside)

EXHIBIT: Will show Bridgeport mechanical rotary drilling rig powered with Waukesha gas engines. This unit will be in operation in a derrick located on a display lot just to the rear of the company's building. With this rig will be a Gumbo Buster drawworks, traveling blocks, and other related equipment. A Bridgeport portable rig front powered with a Diesel engine also will be shown. This unit will include a new type of Bridgeport cable-tool clutch that just recently has been placed on the market. Also on display will be a large Jensen pumping unit powered with the new type vertical Tico engine. All the foregoing equipment will be in motion. Inside the building will be shown the various tools and specialties manufactured by Bridgeport as well as equipment distributed for other manufacturers. Gage Brewer's radio orchestra, which has entertained Bridgeport visitors at the show for the last several years, also will be present.

Representatives: L. A. Babb, sales manager; B. V. Brown, assistant sales manager; Fred Parks, manager of branch stores; and I. C. Lawless, publicity director, assisted by various others in the organization.

●

THE BRISTOL COMPANY
Waterbury, Connecticut

Booths Nos. 15 and 16
Scientific and Technical Building

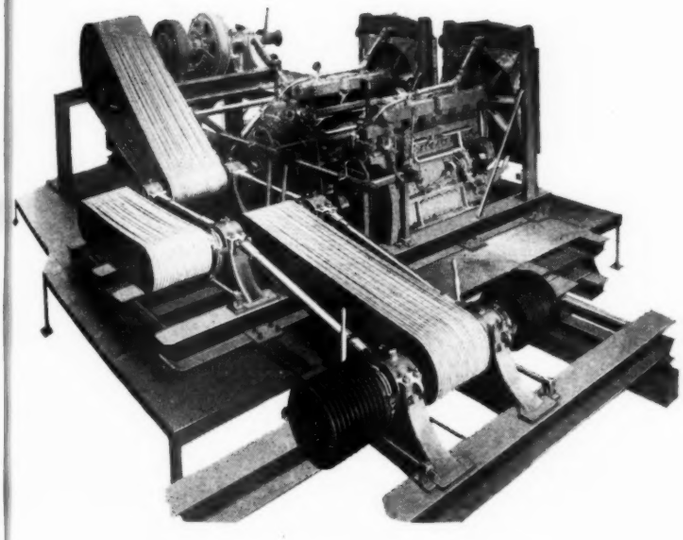
EXHIBIT: Bristol's new instruments for automatic and remote control will be featured. The operation of a new reset free-vane air-operated controller will be demonstrated. This instrument provides for wide throttling range and automatic reset in the control of continuous processes. A reset controller for remote regulator control, using Bristol's metameter system of telemetering, also will be exhibited. A new line of round-chart potentiometer recorders and controllers, known as Bristol's Pyromasters, also will be on display. Other instruments to be exhibited include the wide strip potentiometer single-point recorder controller and six-point recorder with number-printing mechanism; absolute pressure recorder;

THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending Exposition. Register immediately on arrival.

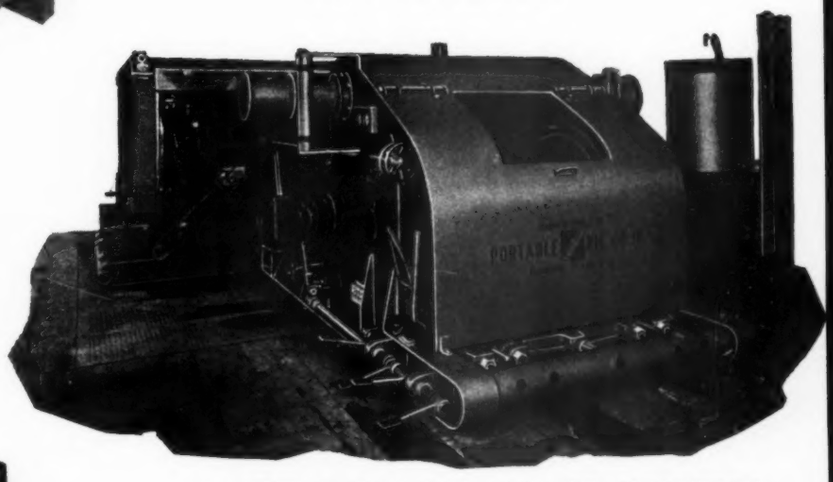
IF YOU ARE INTERESTED IN THE MOST MODERN ROTARY DRILLING EQUIPMENT, DON'T FAIL TO SEE THESE

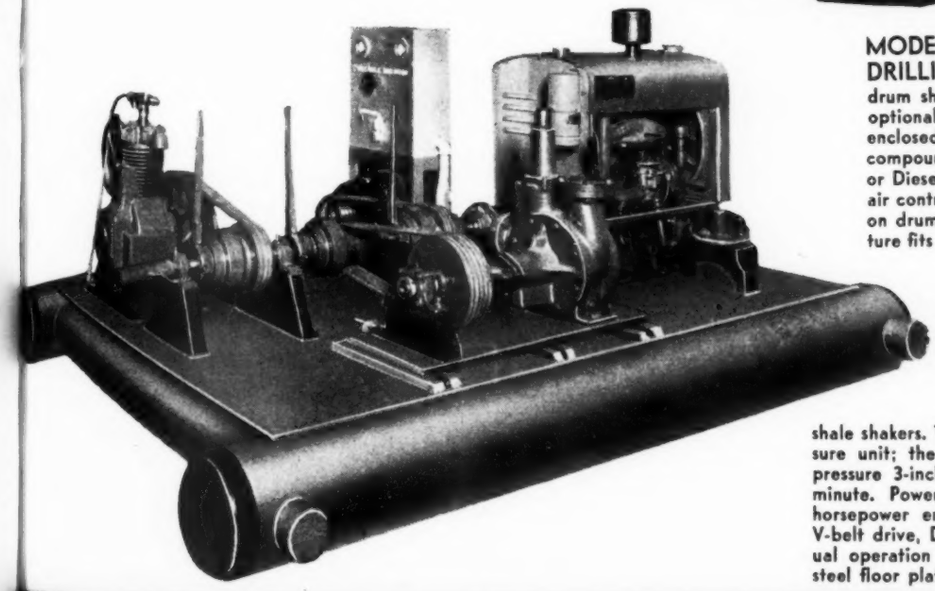
Portable Rigs

IN OPERATION AT THE INTERNATIONAL PETROLEUM EXPOSITION!



MODEL B-100 FOR 10,000-FOOT DRILLING—Two 325-horsepower engines (gasoline, natural gas, or Diesel fuel); V-belt drive; oversize shafts; uses any standard make drawworks, which is driven from heavy-duty reverse clutch by 1240 chain from double sprocket; engine and reverse controls mounted at driller's position and reverse clutch control operates similar to that of steam engine; furnished with any height sub-structure and permits setting pumps on ground level; pulls either one or two pumps.





MODEL R-876-8 FOR 4,000- TO 10,000-FOOT DRILLING—Eight speeds forward, six speeds reverse on drum shaft, rotary shaft, and sand reel if desired; sand reel optional; centralizing controls at driller's position; totally enclosed; self-energizing, water-cooled brakes with double compound leverage; dual engine drive (gasoline, natural gas, or Diesel fuel) can be compounded into drawworks or pumps; air controlled engine clutches, and heavy-duty friction clutches on drum and rotary shafts; forced-feed lubrication; sub-structure fits any size derrick.

MODEL 500 UTILITY PLANT—This Portable Utility Plant is designed for use with rigs where power other than steam is used. The 5-KW (7-KW optional), 125 volts, DC generator furnishes ample power for lights and shale shakers. The air compressor is a 15 cubic foot, 150-pound pressure unit; the 10-inch casing skids serve as a reservoir. The high pressure 3-inch rotary type water pump furnishes 100 gallons per minute. Powered by a model XAHU Waukesha, 4-cylinder, 27-horsepower engine. Completely assembled with instrument panel, V-belt drive, Dodge enclosed friction clutches which permit individual operation of each unit, and mounted on a rugged base with steel floor plate.

recording system-and-bulb thermometer, and electrical recorders.

Representatives: A. A. Blackman, St. Louis district manager; R. A. Barnes, sales engineer; D. D. Ault, sales engineer; H. E. Beane, field sales manager, and H. A. Van Hala, Birmingham district manager.

●

BRODERICK AND BASCOM ROPE COMPANY
St. Louis, Missouri

Exhibiting with Continental Supply Company.

●

RALPH N. BRODIE COMPANY, INC.
Oakland, California

Booths Nos. 8 and 9

Refiners and Marketers Building

EXHIBIT: Display will consist of positive displacement meters and accessories, such as strainers and air eliminators, for measuring and recording petroleum products as they flow through a pipe line, either under pump or gravity pressure. These are adapted for service on truck tanks, loading racks, various types of pipe line service, etc.

Representatives: Warner Lewis, J. J. Kropp, Walter W. Brown, G. B. Richards, and G. F. Burnett.

●

THE BROWN INSTRUMENT COMPANY
Philadelphia, Pennsylvania

Booths Nos. 41 and 42

Scientific and Technical Building

EXHIBIT: Will demonstrate a complete line of indicating, recording, and automatic control instruments for refineries and natural gasoline plants. The panel board display will include several types of air-operated controllers for automatically-regulating temperature, pressures, flows, and liquid levels. Featured in this exhibit is a working demonstration showing an indicating transmitter, equipped with the Brown Pneumatic Remote Transmission System by which temperature, pressure, flow, and liquid level measurements may be indicated, recorded, and controlled remotely. The Brown combined electric and air-operated flow and liquid level system for remote transmission also will be in operation with the Brown Pneumatic Remote Transmission System.

Other Brown instruments mounted on the centralized control panel board in operation include:

Brown multiple-recording and controlling potentiometer pyrometer: Where it is desirable to record several temperatures on one chart, this instrument will not only record but it also will control from two to six temperatures from as many different thermocouples, the manufacturers state. Three other features are pointed out: 1. The chart drum is made of steel with a vulcanized rubber cover, similar to that used on a typewriter. 2. Uses specially-hardened steel print wheel with machine-cut numerals. Both of these features assure maximum legibility of chart records, it is stated. 3. The plus sign is used for recording temperatures. It has special significance, namely, the horizontal line is the time coordinate and the vertical line of the plus sign identifies the temperature.

Brown Air-o-Line controller—For coordinating temperatures, pressures, flows, and liquid levels.

Brown flow meters in both electrical and mechanical types.

Brown manually-balanced potentiometer—An indicating manually-balanced potentiometer in a large switch cabinet for supervisory temperature measurements.

Brown multiple-recording resistance thermometer—This can be supplied to produce up to six records in distinctive colors. A dial on the switch is printed in colors corresponding with each colored record line.

Representatives: L. Morton Morley, vice-president and general sales manager; R. L. Mallory, branch manager; F. M. Poole, branch manager; E. B. Kohl, Houston, Texas; R. W. Groendycke, Houston; E. H. Thompson, Dallas, Texas; B. W. Cullen, Houston; and R. P. Walker, Tulsa, Oklahoma.

●

BUCKEYE TRACTION DITCHER COMPANY
Findlay, Ohio

Block 102 (outside)

EXHIBIT: The new Model 49 Buckeye Ditcher, the Buckeye Model 12 Utility Service Ditcher, and the Clipper Excavator will be featured.

The Buckeye Model 49 Ditcher, cutting widths of ditching from 22 to 40 in., with depths of 8½ ft., is the company's latest design in big pipe line ditchers. Transmission drives for all operations eliminate the older type of open drive, making the most efficient use of power and simplifying the servicing of the machines, the manufacturers point out. All transmissions have heat-treated cut gears in oil-tight cases. For all its rugged strength and power and despite the size of trench it digs this new Buckeye is handled with remarkable ease, it is stated.

The Buckeye Model 12 Utility Ditcher is considerably smaller than the Model 49, but on the jobs that come within its range of trench—14½ to 24 in. wide and to 5½ ft. deep—this fast little ditcher is a giant in ability, it is stated.

The other machine to be displayed, the Clipper, is a convertible excavator that may be had equipped for shovel, dragline, crane, clamshell, trench hoe, and pile driver. A feature of this machine that is attracting a great deal of attention is the new (Mevac) metered vacuum control, with all operations individually controlled by easy-working valve levers that respond to a light touch of the fingers. The Buckeye Clipper is built in ½-, ⅝-, and ¾-yd. sizes.

Representatives: W. H. Schomberg, general manager; and G. C. Swartz, district manager.

●

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Block 4 (outside)

EXHIBIT: The equipment on display will include a 10-B, ⅜-yd. shovel in operation; a Bucyrus-Erie bullgrader mounted on an International T-40 tractor; several new and unusual detachable spudder bits; miscellaneous drilling and spudding equipment including a welding fixture, a device for use with detachable bits.

Representatives: G. R. Watson, L. B. Birckhead. P. H. Birckhead, general sales manager, W. K. Fawcett, J. A. Garber, and F. O. Wyse, all of South Milwaukee, and H. A. Titus, Kansas City manager.

●

THE BUDA COMPANY
Harvey, Illinois

Lot M (outside)

EXHIBIT: The engines on display will be the Model 6-LD-1742 Buda-Lanova Diesel drilling engine equipped with a Model 4-DT-196 Buda-Lanova Diesel starting engine; Model P-1879 gas-gasoline drilling engine equipped with a Model HP-217 gasoline starting engine; Model 6-LD-691 Buda-Lanova Diesel hoisting engine, and Model JK-4 and Model YR-425 pumping engines.

Representatives: R. K. Mangan, sales manager; J. C. Baseheart and R. H. Heberling, sales engineers; and representatives of distributors, Buda Engine Service of Tulsa, Inc., Buda Engine and Equipment Company of Houston, and Production Equipment Company of Los Angeles.

THE BUNTING BRASS & BRONZE COMPANY
Toledo, Ohio

Booth No. 133

Refiners and Marketers Building

EXHIBIT: Will have on display all types of bearings used in the oil industry, cored and solid bar bronze, oilless bearings, babbitt metals, etc.

Representatives: G. H. Adams, Toledo, Ohio, director of sales; and J. R. Roberts, Texas representative.

●

BUTLER MANUFACTURING COMPANY
Kansas City, Missouri

Block P (outside)

EXHIBIT: The following equipment will be displayed: Butler ready-made steel oil-field buildings; Butler bolted tanks, runways, and stairways; separators; and truck tanks.

Representatives: W. E. Botz, Louis Brown, R. W. Downes, and G. A. Burns.

●

BYRON JACKSON COMPANY
Los Angeles, California

Booths Nos. 24, 25, 26, 27, and 28

Oklahoma Building

EXHIBIT: Equipment on display will be: (a) Oil Tool Division: Cable-tool bits, disc bits, tubing bleeders, casing elevators, casing hooks, casing tongs, Surestop tubing catchers, shortype "C" catchers, cat line grips, weldless links, orifice fittings, slush pump pistons, tubing tongs, slush pump valves, tong dies, drill pipe elevators, rotary elevators, production elevators, rod elevators, drilling, tubing and rod hooks, rotary tool joints, safety joints, Perfection links, Perfection underreamers, rotary tongs, triplex hooks—100-, 150-, and 300-ton. (b) Pump Division: Hot-oil charging pump, and built-on and multi-stage pump.

Representatives: Frank Champion, O. W. Morgan, Jr., D. O. Pugh, C. F. Vincent, B. A. Hilliard, H. E. Grau, Lynn Sawyer, J. J. O'Connor, Jr., E.W. Baker, and J. Progress.

●

CAMERON IRON WORKS, INC.
Houston, Texas

EXHIBIT: The following Cameron equipment will be on display: Pressure-operated blowout preventers, pressure-operated gate valves, drilling control hook-ups, manually-operated blowout preventers, Flex-Seal gate valves, Christmas trees, "Old Ocean" type long-string casinghead, rotary core barrel, master control tubingheads, re-setting tubing plugs, wire-line core barrel blowout preventer, expansion tube flow choke, and Cameron casingheads.

Representatives: J. S. Abercrombie, Ed Lorehn, Lew Hilton, and Paul T. Putnam.

●

CATERPILLAR TRACTOR COMPANY
Peoria, Illinois

Block E (outside)

EXHIBIT: Representative units of the company's line of Diesel track-type tractors, industrial engines, and power units will be shown. Tractors and engines will be equipped with accessories of interest to those concerned with the production, transportation, and refining of petroleum.

Representatives: I. J. Howald will be in charge. Officials and representatives from the executive and sales staffs will attend.

●

THE CAVINS COMPANY
Long Beach, California

Booths Nos. 127 and 128 Kansas Building

EXHIBIT: Display will consist of models, etc., of: the Cavins automatic hydraulic suction bailer, the Cavins perforation washer, the Cavins screen opener, and the Cavins sand pump, together with their accessories and performance data.

Representatives: Paul Cavins, general manager, will be in charge of the exhibit,

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.

Register Immediately Upon Entering Show Grounds

AT THE PETROLEUM ENGINEER REGISTRATION BUILDING

Drake Drive, Near 21st Street Entrance

THE 1938 International Petroleum Exposition will be the largest in the history of the event. Some fifty percent more exhibit space has been allotted than ever before. Attendance promises to increase accordingly.

It is the purchase of exhibit space by manufacturers of oil and gas equipment and supplies that has made the Tulsa Exposition the largest machinery show in the world. In past years, however, these exhibitors have been handicapped by the fact that no official registration has been conducted so that visitors at their booths could be identified. With so many thousands constantly on the grounds it has been next to impossible to give their friends and customers the amount of attention they deserve.

This year a number of prominent exhibitors have joined *The Petroleum Engineer* in conducting a registration whereby each visitor actively connected with the petroleum industry will be badged. The color of the badge will indicate the division of the industry in which the individual is employed. A list of participating exhibitors follows:

Allis-Chalmers Mfg. Co.
Allsteel Products Mfg. Co.
American Chain & Cable Co.
American Iron & Machine Works
American Steel Derrick Co.
Axelson Mfg. Co.
Baash-Ross Tool Co.
Baker Oil Tools, Inc.
Baroid Sales Co.
Bastian Blessing Co.
Bethlehem Supply Co.
Black, Sivalls & Bryson
Bovaird Supply Co.
Bridgeport Machine Co.
Byron Jackson Co.
Cameron Iron Works
Chapman Valve Mfg. Co.
Chiksan Oil Tools Co.
Clark Bros.
Continental Supply Co.
Cooper, Fred E., Co.
Crane Co.
Darling Valve & Mfg. Co.
DuPont, E. I., de Nemours & Co.
Emsco Derrick & Equipment Co.
Fisher-Governor Co.
Fluid Packed Pump Co.
Franks Mfg. Co.
Frick-Reid Supply Corp.
Gaso Pump & Burner Mfg. Co.
Guiberson Corp.
Gustin-Bacon Mfg. Co.
Hanlon-Waters, Inc.
Hercules Motors Corp.
Hinderliter Tool Co.
Chas. N. Hough Mfg. Co.
Hughes Tool Company
International Derrick & Equip.
International Harvester Co.
International Petroleum Exposition
International Supply Co.
Johnston, M. O., Oil Field Service
Jones, S. M., Co.
Jones & Laughlin Steel Corp.
Kerotest Mfg. Co.
Koppers Co.
Lane-Wells Co.
Lebanon Steel Foundry
Leschen, A., & Sons Rope Co.
Lucey Products Corp.
Lufkin Foundry & Machine Co.
Maloney Tank Mfg. Co.
Martin-Decker Corp.
Mid-Continent Pump & Supply Co.
Mid-Continent Supply Co.
Mission Mfg. Co.
Moore & Co., Lee C.
Moorlane Co.
Muskogee Iron Works
National Supply Co.
National Tank Co.
Norris, W. C., Mfr., Inc.
Oil Country Specialties Mfg. Co.
Oil Well Improvements Co.
Oil Well Supply Co.
Patterson-Ballagh Corp.
Pittsburgh Equitable Meter Co.
Portable Rig Co.
Rector Well Equipment Co.
Reed Roller Bit Co.
Refinery Supply Co.
Republic Steel Corp.
Republic Supply Co.
Seismograph Service Corp.
Shaffer Specialty Co.
Shaffer Tool Works
Skelly Oil Co.
Smith Separator Co.
Sonner Burner Co.
Spang & Co.
Twin-Disc Clutch Co.
Union Wire Rope Corp.
United Supply & Mfg. Co.
Vortox Mfg. Co.
Walworth Co.
Westcott & Greis
Westinghouse Electric & Mfg. Co.
Whitney Chain & Mfg. Co.
W-K-M Company
Worthington Pump & Mch. Corp.
Young Engine Corporation

This list is not yet complete. It is anticipated that a few more companies will join in this very worthy project. A complete roster will be shown in the windows of *The Petroleum Engineer* registration building located on Drake Drive near the 21st street entrance. There also will be shown the valuable awards to be given during show week as a part of the registration plan.

assisted by John Mulcahy, Mid-Continent manager; G. W. Moore, California manager; and Tom Sharp, South and East Texas representative.

THE CENTRAL FORGING COMPANY
Catawissa, Pennsylvania

Booth No. 29 **Oklahoma Building**

EXHIBIT: Catawissa unions and Catawissa flow line and boiler feed line swing check valves.

Representatives: H. Blain Lacy, district manager, Tulsa, Oklahoma; John A. Hill, and A. C. Lewis.

CHAIN BELT COMPANY
Milwaukee, Wisconsin

Booths Nos. 70 and 71 **Texas Building**

EXHIBIT: Will consist of a display of samples of the various sizes and types of Rex chains and sprockets manufactured by the company for oil-field use. Included will be Rex Chabelco, Rex Deepwell, Rex Champion, Rex Universal, and Rex Roller Chain. Pictures of products working in the oil fields also will be shown.

One of the featured chains on display, the Rex Champion No. 3 and No. 4, corresponds to the A.P.I. 3 and the A.P.I. 4 sizes and is made with the same principles of alloy steels, highly-finished bearing surfaces and precision manufacture that are found in the well-known Rex Deepwell chain, which also will be featured. Rex Champion is a heavier chain having a higher ultimate strength and is recommended for extremely hard and deep drilling where excessive loads in the final stages of the deepest holes are the main factors. This idea will be featured at the show in connection with the Continental Oil Company's KCL-A2 "the deepest well in the world" on which Rex Champion Chain was used. Rex Champion No. 3 has an ultimate strength of 75,000 lb. and the No. 4 an ultimate strength of 170,000 pounds.

Rex Deepwell Chain, the chain for the wider working range in all types of drilling, also will be shown. It has the highly-finished surfaces and precision manufacture to give it the ability to stand up under modern high-speed drilling. It is especially useful on unitized drawworks for the many fields where drilling may range from easy to hard.

Rex Universal No. 3125, which is made with the same precision and polished bearing surfaces that characterize all Rex oil field chains, also will be shown. This chain is recommended by the makers for tough drilling at higher speeds and does not run on the same sprockets as the A.P.I. 3 and 4 chains. Its ultimate strength for the single strand is 115,000 and 230,000 lb. for the double strand.

Rex Roller Chain will be displayed in single, double, triple, and quadruple strands for various types of drilling and drive units in the oil field.

Representatives: Brinton Welser, Maurice Jewett, Russell Davis, Walter Snavely, and William Pitts.

CHAMPION MACHINE AND FORGING COMPANY
Cleveland, Ohio

Exhibiting with Continental Supply Company.

THE CHAPLIN-FULTON MANUFACTURING COMPANY
Pittsburgh, Pennsylvania

Booth No. 40
Scientific and Technical Building

EXHIBIT: Reducing and back-pressure regulators, motor or diaphragm valves, liquid-level controllers and duplex vacuum regulators for storage tanks will be displayed.

Representatives: A. M. Brooks, T. H. Thorn, and J. P. Kelly.

THE CHAPMAN VALVE MANUFACTURING COMPANY
Indian Orchard, Massachusetts

Booths Nos. 12, 13, and 14 **Texas Building**

EXHIBIT: The exhibit will include a comprehensive display of valves for the production, refining, and transportation of oil. Steel valves for all pressures and temperatures will be displayed. Also complete metallurgical information will be given on various types of steel and alloys recommended for standard and special service in the petroleum industry.

Representatives: G. L. Griffin, manager of oil and gas division; V. T. Malcolm, director of research; G. E. Fox, chief engineer and works manager; M. C. Jacobs, Tulsa, Oklahoma, representative; R. F. Maher, Houston, Texas, representative; and J. E. Koch, St. Louis, Missouri, representative.

CHASE BRASS AND COPPER COMPANY
Waterbury, Connecticut

Booths Nos. 134 and 135 **Texas Building**

EXHIBIT: The exhibit will feature four kinds of Chase condenser and heat exchanger tubes for use in oil refinery work—Antimonial Admiralty, Red Brass, Copper (Cupro) Nickel, and Admiralty.

Another interesting feature will be a display of tensile test specimens before and after a period of testing under as nearly as possible actual service conditions either in the water box of an operating condenser or in the vapor stream. Determinations of tensile strength and elongation, made before and after the tests, will be given.

Will show also polished Olympic Bronze pump rods. The Chase exhibit will include, too, a large assortment and many sizes of Chase Olympic Bronze bolts and nuts, which are used on heat exchangers, filter drums, cooling towers, and other equipment where high strength and corrosion resistance are necessary.

Representatives: N. W. Mitchell, J. F. Dumser, and A. F. Sheldon.

CHEVROLET MOTOR DIVISION
General Motors Sales Corporation
Detroit, Michigan

Block T (outside)

CHICAGO BRIDGE & IRON COMPANY
Chicago, Illinois

Booths Nos. 86 and 125 **Texas Building**

EXHIBIT: Will display photo murals of the company's various products on the side walls of the booth. These murals will include illustrations of Wiggins pontoon roofs for working tanks, Wiggins floating roofs for pipe line service, Wiggins breather roofs, and Wiggins balloon roofs for standing storage tanks, Wiggins balloon system for groups of storage tanks, the Hortonsphere for the storage of liquids and gases at pressures from 25 to 100 lb. per sq. in., the Hortonspheroid for the storage of motor fuel, natural gasoline and other volatile liquids at pressures from 1 to 25 lb. per sq. in., and refinery equipment. There also will be an automatic Baloptican showing 40 views of various installations. Special types of vents also will be shown.

CHIKSAN OIL TOOL COMPANY, LTD.
Fullerton, California

Booths Nos. 26 and 27
Refiners and Marketers Building

EXHIBIT: On display will be all-steel, heavy-duty rotary hose, heavy-duty swing joints, all-steel cement joints, low-pressure swing joints, dock risers, circulating head, mud-mixing gun, and loading rack joints.

Representatives: Dean Love, president; Earle Atkins, sales manager; and Herb E. Maland, engineer.

CLARK BROTHERS COMPANY
Olean, New York

Block U (outside)

EXHIBIT: Will display, in actual operation, the 400-hp. 4-cylinder size of the Clark Super-2-Cycle Right-Angle Compressor. This compressor was first exhibited to the public at the 1936 Exposition, in the 3-cylinder, 300-hp. size. It is now being made in 2-cylinder, 3, 4, 5, and 6-cylinder sizes, ranging from 200 to 600 horsepower. This compressor combines the simplicity of the Clark Super-2-Cycle Horizontal Compressor with the advantages of the Clark vertical gas engine, it is stated. Will also exhibit the new type Clark Bobcat and Clark Bobkitten vertical pumping engines, and Clark triplex high-pressure pump.

Representatives: C. P. Clark, president; J. B. O'Connor, vice-president; D. K. Hutchcraft, Mid-Continent sales manager; F. H. Hayes, district manager, Houston territory; George W. Probst, salesman; W. A. Roever, salesman; J. N. MacKendrick, chief engineer; T. C. Webb, technical service department; V. H. Lich, warehouse and service manager; and possibly several others from the company's eastern offices.

CLARK ELECTRICAL SUPPLY COMPANY
Tulsa, Oklahoma

Booth No. 49
Refiners and Marketers Building

EXHIBIT: Display will consist of Westinghouse Mazda lamps, Appleton Electric Company products such as Unilets, regular vapor-proof and explosion-proof, Pass and Seymour and Arrow Electric Company lines of wiring devices, Red Cap spot lights, and Goodrich flood lights and reflectors.

Representatives: J. P. Clark and R. A. Almond.

THE CLEVELAND TRENCHER COMPANY
Cleveland, Ohio

Block P (outside)

EXHIBIT: Display will consist of the company's latest models of pipeline ditchers and allied equipment.

Representatives: V. S. Penote, J. A. Penote, J. R. Overs, A. R. Askue, E. Z. Drummond, and W. A. Fisher.

CLIMAX ENGINEERING COMPANY
Clinton, Iowa

Exhibiting with Continental Supply Company.

COFFING HOIST COMPANY
Danville, Illinois

Booth No. 13 **California Building**

EXHIBIT: The new Coffing safety-pull ratchet lever hoists, the new Coffing power master spur gear gravity lowering hoists, the new Coffing electric hoists, and the Coffing load binders will be on display.

Representatives: J. R. Coffing and Ray Doan.

COLUMBIAN STEEL TANK COMPANY
Kansas City, Missouri

Block 102 (outside)

COMPRESSED INDUSTRIAL GASES, INC.
Tulsa, Oklahoma

Booths Nos. 96, 97, and 98
Oklahoma Building

EXHIBIT: The complete line of Hollup Sureweld welding electrodes and their various test specimens will be shown and in conjunction with this a complete line of welding and cutting equipment, both electric and acetylene, will be on display. Several special cutting machines for making straight line cuts, as well as special dia-

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grams, etc., also will be a part of the exhibit.

Representatives: R. E. Long, chief engineer, and Frank Cusson, assistant engineer.

●

CONSOLIDATED ASHCROFT HANCOCK DIVISIONS

Manning, Maxwell and Moore, Inc.
Bridgeport, Connecticut

Booth No. 19
Scientific and Technical Building

EXHIBIT: The following equipment will be displayed: American temperature and pressure control instruments, American dial and indicating thermometers, "Any Angle" thermometer, American Micro Moto reset, American Micro Moto diaphragm valve positioner, American pneumatic temperature transmission system. Ashcroft pressure gauges, Duragauges, recording Duragauges, Duragauge pressure transmitter, Consolidated oil still safety and relief valves, Consolidated oil field boiler pop valves, Hancock globe valves, Duravalve, and Hancock blow-off valves.

Representatives: Messrs. Black, Velie, and Ives.

●

CONTINENTAL CHEMICAL COMPANY

Sand Springs, Oklahoma

Booth No. 39
Scientific and Technical Building

EXHIBIT: Display will consist of Continental Zeolite water softener, Simplex type; Continental gas sweetener and purifier, a new device for removal of gaseous or entrained impurities from gases; chemicals pertaining to water treating and softening.

Representatives: Dr. F. T. Gardner, vice-president; E. W. Holden, manager; and Geo. H. Oertel, chemical engineer.

●

CONTINENTAL MOTORS CORPORATON

Detroit, Michigan

Booths Nos. 95, 96, 121, and 122
Kansas Building

EXHIBIT: Display will consist of heavy-duty gasoline, kerosene, fuel-oil-burning, and natural-gas burning engines in 4- and 6-cylinder types "L" head and overhead valve, both open-type and enclosed-type power units with power take-off and clutch, ranging from small engines suitable for pipe-line work and stand-by service to the heavy-duty units. Will also exhibit two engine generator sets, one 5 kw. and one 8.3 kva; a 2000-watt light plant, two Tiny Tim portable light plants and battery chargers ranging from 150 to 300 watts, 6, 12, and 32 volt.

Representatives: B. F. Tobin, Jr., vice-president in charge of sales; F. F. Schwilk, supervisor of sales; Eric Zachau, sales representative; and Lyle Stringham, sales representative.

●

THE CONTINENTAL SUPPLY COMPANY

Dallas, Texas

Block 6 (outside)

EXHIBIT: Under the auspices of The Continental Supply Company, a wide range of drilling and production equipment produced by affiliated manufacturing companies will be displayed in the company's new building and on the adjacent property.

Of especial interest will be the newly developed KEM Electro-Mechanical Rotary Drilling Rig. Such firms as Fairbanks, Morse and Company, Gardner-Denver Company, and Emsco Derrick and Equipment Company have collaborated with Continental engineers to produce the KEM Rig and make it a unit that should attract wide attention among Exposition visitors. Other associated firms will have auxiliary pieces of equipment on exhibit in connection with the KEM Rig, showing their use in actual operation.

Another coöperative effort will be that of The Falk Corporation, The Climax Engineering Company, and Fairbanks, Morse and Company in displaying the latest in geared pumping equipment with specially-designed oil-well prime movers.

Representatives of The Continental Supply Company at the Show will include W. J. Morris, president; F. M. Mayer, vice-president and treasurer; F. I. Brinegar, vice-president; C. H. Meyer, manager of sales; N. A. Endicott, assistant manager of sales; Chas. W. King, manager of tubular sales; A. J. Olson, chief engineer; J. C. Slonneger, assistant chief engineer; H. E. Spencer, director of purchases; C. N. Swanson, district manager; F. H. Thrailkill, district manager; E. N. Wood, district manager; Dwight A. Davis, district manager; M. D. Smith, district manager; W. V. Moore, assistant district manager; R. D. Mannix, assistant district manager; J. D. Chapman, assistant district manager; R. L. Collier, assistant district manager; J. H. Berry, assistant district manager; T. D. Collins, assistant district manager; F. J. Lafitte, assistant district manager; and W. D. Craig, assistant district manager.

The description of the major items of equipment to be displayed by each of the affiliated companies follows:

BRODERICK AND BASCOM WIRE ROPE:

Samples of wire rope used especially in the oil industry will be shown. The display will feature samples that show the Preformed construction of Broderick and Bascom wire line, for use as drilling lines, sand lines, rod lines, and winch lines. In addition, factory methods will be explained.

Representatives at the Show will include J. K. Broderick; Fred Zimmerman, sales manager; M. R. Gayle, Mid-Continent sales manager; D. E. Dickey; E. E. Deacon, R. A. Hill; and L. R. Saunders.

CHAMPION MACHINE AND FORGING COMPANY:

The Champion Coupling, including the newly-devised coupling for plain-end pipe will be exhibited. Extremely useful for hook-up purposes around wells, this coupling is made up and broken down quickly; a convenience for general oil-country installations. Champion is also well known for its forgings, and will exhibit some intricate forgings.

Representatives at the Show will include J. F. Connelly, vice-president; and F. W. Suhr.

CLIMAX ENGINEERING COMPANY:

Production men should be interested in the Climax G-4-C oil-well pumping engine designed to give unusual stability and remarkable freedom from vibration. The engine is not one adapted from ordinary industrial service, but has been specifically fitted to do the job of oil-well pumping. Its box base construction provides a large oil sump as well as structural stability.

Representatives at the Show will include E. F. Deacon, president; E. D. West, sales manager; T. C. Keeling, Mid-Continent sales manager; R. H. Kerr, chief engineer; and H. A. Hanson, service engineer.

D & B PUMP AND SUPPLY COMPANY:

Assemblies of numerous D & B pumps with cut-away parts to show their operation will be featured by D & B. This company makes a specialty of producing pumping equipment to meet situations that are difficult to handle. Various types of D & B pumps to overcome unusual problems will be exhibited and explained. In addition, a general line of pumping equipment, including both surface and sub-surface accessories as well as sucker rods and pull rods, will be shown. D & B is well-known for the alloy steel used in manufacturing their equipment; A.P.I. standards are rigidly adhered to, so that parts will be interchangeable. Production men from every field will find some operation of the D & B exhibit that should interest him.

Representatives at the Show will include E. E. Steveson, manager of production; L. C. Scott, manager Mid-Continent Division; and R. M. Bolieau, assistant manager of sales.

EMSCO DERRICK AND EQUIPMENT COMPANY:

The Type 18-AR 136-ft. Emsco derrick, mounted on a sub-structure, will be an identifying feature of the entire Continental exhibit. Built around this derrick and in actual operation will be the KEM Electro-Mechanical Rig. The Emsco A-506 5-sheave ball-bearing crown block, and Type A-94-50 5-sheave ball-bearing traveling block will be installed, together with the new Type "F" swivel, DEL 54 Emsco draw-works, and JS-20½ rotary machines; 4¼-in. by 40-ft. upset drill-in stem, and Type "G" motor reductions gear also will be exhibited.

Representatives at the Show will include H. C. Morehouse, vice-president and sales manager; W. D. Davidson, chief engineer; G. W. Walton, vice-president; S. W. Webster, engineer; and P. D. Browne, superintendent.

FAIRBANKS, MORSE AND COMPANY:

Two 6-cylinder F-M Model 35-E-10 Diesel rotary drilling engines will be exhibited in connection with the KEM Electro-Mechanical Drilling Rig. These engines have a long oil-country record of reliable performance and are exhibited at this year's Show with numerous improvements. Both oil filters and air filters have been used as standard equipment. The engines are exceptionally rigid and have advantages of slow-speed operation, yet have light-weight Diesel accelerating characteristics. The visitor will be impressed with their basic and extreme simplicity.

The Model 34-AC 3-cylinder 6 by 6½ oil-well pumping engine will be exhibited on a 20KBT-106CH Continental-Falk geared pumping unit. Thoroughly field proven for oil-well pumping service, the essential moving parts of this engine are identical with those of a proved design in long industrial use. Its outstanding advantages include heavy pistons for dissipating heat, heavy crankshafts, perfectly counterbalanced, and heavy flywheels to provide unusually smooth operation. The governor design permits variation of the degree of sensitivity, a highly desirable quality in pumping service.

Probably no engine in the oil country is better known than the Fairbanks-Morse "Z" engine, in new dress with force-feed oiling system. A built-in circulating pump insures normal temperatures and cool operating conditions at all times, the manufacturers state. The extra-heavy flywheels give the smoothest operation possible. It will be mounted on a 10HTD-50CD geared pumping unit.

Representatives at the Show will include P. C. Brooks, vice-president; A. E. Ashcroft, vice-president; H. J. Renken, manager oil field division; F. P. Grutzner, assistant chief engineer; F. D. Ratcliffe, Oklahoma-Kansas district; and H. D. Gobble, Texas district.

THE FALK CORPORATION:

An assortment of gears, including the 106, 70CD, and 50CD will be shown with Continental-Falk pumping units in actual operation. The Falk Trough System of lubrication insures an unfailing supply of clean lubricant to all bearings, while special oil retainers prevent any leakage of oil and

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seal the lubricant against the admission of dirt and dust particles.

The 80CGP geared power to be displayed, incorporates the combined ideas of leading petroleum engineers and the field experience of these men over a period of years. The bearings automatically provide for compensation of temperature change without adjustment. A submerged oil pump eliminates any necessity of priming, and gives positive pressure lubrication. The crank throw is interchangeable in the field without the necessity of special tools.

Representatives at the Show will include E. P. Connell, vice-president; W. L. Schneider, sales engineer; T. F. Scannell, Mid-Continent manager; W. P. Schmitter, engineer; W. V. C. Jackson, representative; and M. A. Carpenter, sales manager.

FARRAR AND TREFTS:

The ultra-modern 130-hp., 300- and 350-lb. working pressure F&T boiler will be attractive with its completely fusion-welded construction, extra long fire box, and low dome. Featuring fusion-welded seams that are X-rayed before shipment from the factory, F&T offers an exclusive product, the makers state. X-ray photographs showing boiler seams also will be displayed.

Representatives at the Show will include John C. Trefts, president; and S. Mensonides, vice-president.

GARDNER-DENVER COMPANY:

Among the new items of steam equipment to be featured by Gardner-Denver will be the 14 by 14 new twin-drilling engine that is said to offer unusual steam economy. Operating on compressed air for exhibition purposes, its working parts will be clearly displayed. Other items will be the 7¾ duplex power slush pump, V-belt driven by a 9½ by 8 vertical steam engine. This unit also will be operated by compressed air. A 7¾ by 20 duplex power slush pump will be exhibited in connection with the KEM Electro-Mechanical Rig.

Representatives at the Show will include H. G. Myers, president; E. F. Schaefer, vice-president; R. J. MacFarland, sales manager; G. J. MacFadden, chief engineer; and R. J. Bauer, representative.

GENERAL ELECTRIC COMPANY:

The KEM Electro-Mechanical Rig features the use of the General Electric 330-kw., d-c. generator having a complete voltage control system. In addition, a 425-hp. General Electric rotary drilling motor will be exhibited in connection with this rig. These two G-E items constitute the latest idea in electrical rotary-drilling equipment. Capable of high overloads without overheating, their electrical refinements have made them outstanding.

Representatives at the Show will include R. L. Smallman, manager of exhibit; R. T. Shiels, district manager; Geo. W. Prout, representative; A. L. Jones, district manager; E. F. Patterson, representative; R. G. Smith, representative; F. B. Hathway, district manager; Ralph Randall, representative; L. T. Blaisdell, representative; J. J. Huether, manager oil equipment sales; W. G. Taylor, petroleum engineer; M. M. Burgess, general manager oil equipment sales; I. T. Hockaday, district manager; Geo. W. Curry, representative; and C. A. Maas, representative.

MECHANICAL RUBBER COMPANY:

Belting especially designed for oil country use will be the feature of the Mechanical Rubber Company's display. Special cord-ply construction permits correct adjustment of plies to the required weight and strength imposed, with minimum elongation under shock loads.

Super Rough Rider rotary hose, resisting abrasion with its multiple plies of strong cotton duck, flat-braided steel wire, and durable live rubber will be exhibited both in the Continental Building and in the outside exhibit in connection with the KEM Electro-Mechanical Rig.

Representatives at the Show will include B. F. Ruether, president; A. M. Langley; L. M. Deutsch; W. E. Belcher, Mid-Continent manager; and B. F. Franklin, representative.

NEW BEDFORD CORDAGE COMPANY:

New Bedford has been in the business of producing quality cordage for more than 100 years. Samples of the highest grade selected manila fibre chosen from the hemp markets of the world will be featured by this concern. Spinning lines, catlines, drilling cables, and bull ropes will be displayed. New Bedford has been an exclusive distributor to Continental since the organization in 1912.

Representatives at the Show will include Geo. W. Haywood, vice-president; and H. W. Davis, sales manager.

WESTCOTT VALVE COMPANY:

Christmas tree hook-ups, drilling valves, gate valves, in short, almost any type of valve for use in the oil industry will be presented by the Westcott Valve Company. All Westcott products are produced in keeping with the highest metallurgical practice, and both steel and iron body valves represent the perfection of the steel and iron makers' art, according to the manufacturer.

Representatives at the Show will include A. V. Wadsworth, executive vice-president; W. C. Wadsworth; W. B. Chapman; John Walker; and A. A. Tinch.

YOUNGSTOWN SHEET AND TUBE COMPANY:

The parent company of the Continental Supply Company, the Youngstown Sheet and Tube Company, will exhibit samples of casing, tubing, drill pipe, and line pipe in their booth in the Continental Building. A special feature of the tubular display will be Hydril drill pipe, and Youngstown Speed-tite casing, both pioneered and developed by Youngstown engineers. Samples of new Staybolt drill pipe, which avoids the concentration of drill stem vibration in incomplete threads will show how "twist-offs" can be prevented. The newly developed Yoloy tubing that has high yield and tensile strength, provides exceptional resistance to corrosion.

The manufacture of seamless pipe will be completely explained in the model of Youngstown's seamless mill, which shows each operation in the manufacturing process.

Representatives at the Show will include W. E. Watson, vice-president; E. P. Corey, general manager tubular sales; G. W. Christopher, assistant manager pipe sales; J. C. Siegle, general superintendent tube division; M. S. Curtis, sales promotion manager; J. E. Mouthe, field engineer; A. A. Chambers, field engineer; W. C. Main, field engineer; C. E. Markell, field engineer; W. G. Kingelin, field engineer; O. A. Kocher, field engineer; Ora C. Cox; T. Bruce Cox; and T. W. Owings, field engineer.

YOUNGSTOWN STEEL PRODUCTS COMPANY:

This subsidiary of the Youngstown Sheet and Tube Company will display its standard Handle Bar Union, well known in the oil country for its ability to be made up and broken down countless times; and in addition, a new idea—a Tongue and Groove Union. This fitting uses a special gasket fitted into a groove. A tongue machined to precision standards fits accurately into the groove seating on the gasket, providing perfect pressure seal. Cut-away views of this spring check will show how positive sealing and full flow are accomplished.

Representatives at the Show will include Ora C. Cox, manager of union sales; and T. Bruce Cox, field representative.

●

C. LEE COOK MANUFACTURING COMPANY, INC.

Louisville, Kentucky

Booths Nos. 51 and 52 Texas Building

EXHIBIT: On display will be samples of Cook's graphitic iron piston rings, Cookmet sectional compressor rings, Cooktite sealing rings, and a full line of Cook's metallic rod packings, as used on the power and compressor pistons and rods of gas engines employed in pumping natural gas, repressuring, and gasoline extraction services.

Representatives: W. Woobank, F. Black, and Robert E. Kirn.

●

FRED E. COOPER

Tulsa, Oklahoma

No. 15 Arcade Way

Spaces A, B, and D (outside)

EXHIBIT: The complete line of Allis-Chalmers' Models L, UE, UM, and W winch tractors, the Models L, UE, and UM skid winches, and the Models L, E, U, and W power engines will be shown. Featured in the exhibit will be the new giant, model "L" drilling and cleaning-out machine. Model "L", designed especially for rotary and cable-tool drilling, will clean out the deepest wells, it is stated. Maximum line pull in 62.000 lb., spooling 12,600 ft. of ⅞-in. line. Eight line speeds on the drum are instantly available to the operator. The drum is equipped with Cooper air-cooled brakes 52 in. in diameter with a 10-in. face. The unit is powered by a heavy-duty 6-cylinder engine that burns gas or gasoline and has a cu. in. displacement of 844. It has a torque of 550 ft. at 700 revolutions per minute. This unit is also available as skid type for truck mounting and will be on display.

The UE and the UM winch tractors and skid winches are also being shown with double drum, telescoping masts, and cleaning-out equipment.

Representatives: The following salesmen will represent the company: A. G. Bailey, Tulsa, Oklahoma; Downs Blackburn, Lake Charles, Louisiana; H. B. Bloxom, Tulsa; E. H. Cochran, Olney, Illinois; Jack Fincham, Longview, Texas; John Flanagan, Longview; R. R. Kirkpatrick, Los Angeles, California; H. R. Kramp, Tulsa; H. R. Moon, Los Angeles; C. F. Nelson, Longview; C. C. Swancy, Odessa, Texas; B. S. Scott, Wichita Falls, Texas; E. H. Smith, Los Angeles; Jack Smittle, Longview; L. A. Wilsey, Tulsa; B. R. Wiggins, Bakersfield, California; O. J. Work, Beeville, Texas; Orville Work, Casper, Wyoming; Glen L. Wigton, Olney, Illinois; Fred E. Cooper, Tulsa; W. H. Allen, Tulsa; L. F. Coburn, Tulsa; R. W. Stockton, Tulsa; B. H. Beach, Tulsa; J. W. Allen, Tulsa; J. S. Province, Tulsa; H. B. Appleton, Tulsa; E. L. Kirkpatrick, Wichita, Kansas; H. E. Hulsa, Tulsa; Yank Henderson, Dallas, Texas; G. M. Malmo, Milwaukee, Wisconsin; A. F. McGraw, Milwaukee; Ernest Franks, Milwaukee; and W. E. Goranflo, Longview.

●

THE COOPER-BESSEMER CORPORATION

Mt. Vernon, Ohio

Block G (outside)

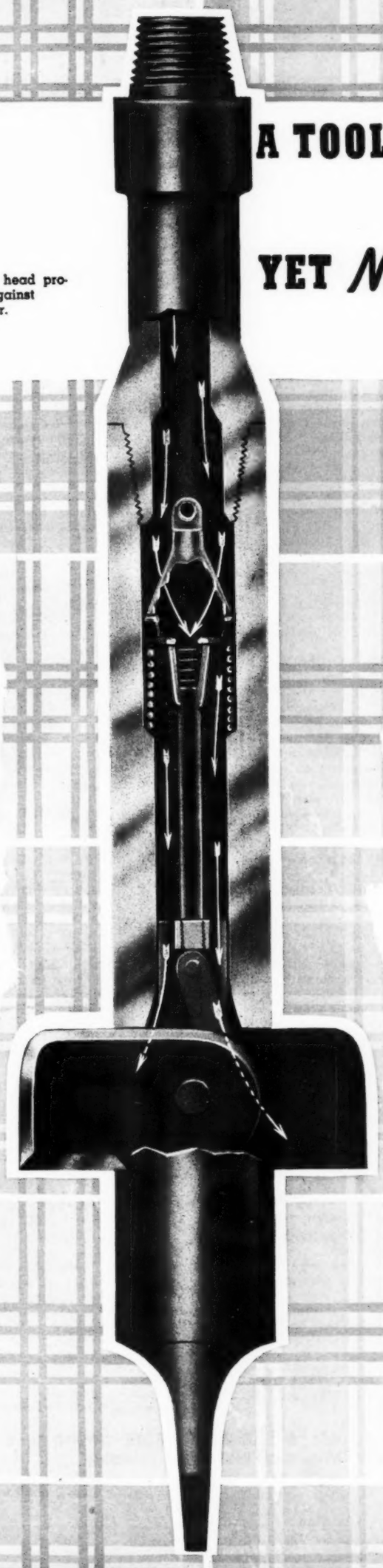
EXHIBIT: Display will feature power and compressor units, both improved and entirely new to the Cooper-Bessemer line—additions to a modern series of engines and compressors for the oil and gas industry, in a complete range of sizes and horsepowers.

Representatives: T. F. Hudgins, vice-president and director of sales; B. L. Pot-

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.

Patented sand control head protects entire tool against abrasive wear.

A TOOL MAY BE GOOD ENOUGH FOR *Domestic* USE YET *Not* GOOD ENOUGH FOR *Foreign* FIELDS



ATURES

he Grant Wallscraper is drаulically operated—working the theory of differential press—therefore the shorter the dis-ce the sand laden fluid has to vel through a restricted open-, the more efficiently the tool ll operate. Note from the draw-—fluid column travels only ⅜" rough the sand control head at h velocity before again being duced to a volume flow.

rculation Flow through tool is a **natural** flow—with lume where volume is required d velocity where velocity is cessary—not directed through arp or unnatural angles—but rough sensible outlets obviously aced in the natural flow line—t effectively using the fluid lumn for the performance of its per function.

brasive Action of sand or er cuttings laden fluid on its wit passage through the tool is t and adequately handled in e bell of the sand control head here the vented streams impinge e upon the other, dissipating eir own destructive force.

arts Protection is amply ovided in this tool in the min-um number required—their skiness of construction—and eir placement with relation to e always present abrasive ac-n of the drilling column of fluid.

WHY

In "the States" it's common practice to rent drilling tools—upkeep costs being borne by the manufacturer—though covered by the rental charge—and operators have no first hand knowledge of what those upkeep costs are.

BUT

Mr. Foreign Operator—you purchase your tools outright—you maintain them—you know how much they cost you—and you know the delays and inconvenience caused by those repairs

THEREFORE

We offer you in the Grant Wallscraper, a tool the upkeep of which is within the control of the operator

BECAUSE

Under the Grant patents the abrasive action of the drilling column of fluid is met by a sand control head—vented with large slots for big pumps and small slots for small pumps—and in the bell of this control head the vented streams impinge one upon the other to dissipate their own destructive force.

STUDY

The drawing on this page—note just how this action takes place—then let us send you our new bulletin showing how this tool will save you time and money.

GRANT

OIL TOOL CO.

2042 EAST VERNON AVENUE

LOS ANGELES, CALIFORNIA

ter, Mid-Continent manager; D. W. McKay, sales engineer; and A. M. Buxton, sales engineer.

●

CRANE CO.
Chicago, Illinois
Booths Nos. 196, 197, 198, 199, and 200
Oklahoma Building

EXHIBIT: The following equipment will be shown: Flow-line valves, double-disc gate valves, solid wedge gate valves, cast-steel gate valves, cast-steel globe valves, malleable-iron gate valves, malleable-iron globe valves, hammer lug unions, flow bean valves, high-pressure relief valves, metering valves, welding fittings, forged-steel flanges, electrically-operated valves, air-operated valves, small brass gate and globe valves, malleable-iron fittings, and welded header (showing Crane Co. technique in welding).

Plan to have a very complete exhibit of the company's equipment that is used by the oil and gas industry.

Representatives: W. Howard Pape, manager, Valve and Fitting Department; R. A. Hendrickson, manager, Oil Sales Section; R. E. Kohn, zone representative; A. J. Armstrong; L. C. Binda; N. S. Edwards; T. S. Jones; G. L. Cavaness; and Mr. Schultz.

●

CRANE PACKING COMPANY
Chicago, Illinois
Booth No. 108 Texas Building

EXHIBIT: "John Crane" dry graphite lubricated flax and plastic for reciprocating pipe line pumps; "John Crane" style 101 babbitt foil for centrifugal pipe line pumps; "John Crane" Style 101AL for centrifugal hot-oil refinery pumps; "John Crane" semi-metallic packing and plastic packings for reciprocating hot-oil refinery pumps; packings complete for every pump service encountered in the entire petroleum industry.

Representatives: F. E. Payne, Chicago, Illinois; M. F. Blackbird, Dallas, Texas; R. W. Overton, Tulsa, Oklahoma; E. B. Heathcott, Houston, Texas; and Roy Blackbird, Chicago.

●

CROSBY STEAM GAGE AND VALVE COMPANY
Boston, Massachusetts
See Westcott and Greis, Inc., Exhibit

●

CROUSE-HINDS COMPANY
Syracuse, New York
Booths Nos. 56 and 57 Oklahoma Building

●

CUMMINS ENGINE COMPANY
Columbus, Indiana
See Mid-Continent Supply Company Exhibit

●

D & B PUMP AND SUPPLY COMPANY
Dallas, Texas Los Angeles, California
Exhibiting with Continental Supply Company.

●

DARLING VALVE AND MANUFACTURING COMPANY
Williamsport, Pennsylvania
Booths Nos. 113 and 114
Oklahoma Building

EXHIBIT: Equipment displayed will include the following: Darling all-bronze gate valves, Darling special-alloy gate valves, Darling pipe-line and flow-line gate valves, Darling forged-steel drilling-through and flow-line gate valves, Darling semi-steel pipe-line, flow-line and gathering-line gate valves, Darling cast-steel gate valves for use on refinery and high-pressure power piping, Darling fire hydrants, Darling balls and seats, and the Darcova, Darval, and Darflex valve cups.

Representatives: J. S. Kiesel, chief engineer; H. B. Foster, assistant sales manager; E. J. Connelly, Oklahoma representative; T. M. Jones, special Darcova representative, and M. L. Hough, vice-president and treasurer.

●

DAVIS REGULATOR COMPANY
Chicago, Illinois
See Westcott and Greis, Inc., Exhibit

●

THE DAYTON RUBBER MANUFACTURING COMPANY
Dayton, Ohio
Booths Nos. 187 and 188
Oklahoma Building

EXHIBIT: Dayton cog-belt drives for use on pumping units, central powers, compressors, slush pumps, generators, and Diesel units, as well as auxiliary equipment.

Representatives: Karl Glanton, vice-president and general manager, mechanical sales department; T. C. Davis, manager, industrial sales; and R. L. Wetzel, advertising director, all from Dayton, Ohio; E. P. Spore, district sales representative, and D. T. Winter, district representative, Dallas, Texas; and R. E. Schofield, district representative, Houston, Texas.

●

DEARBORN CHEMICAL COMPANY
Chicago, Illinois
Booths Nos. 106 and 107 Texas Building

EXHIBIT: Display will consist of rust preventives, pipe coatings, including new development of shielding wrappers having improved dielectric properties; also feedwater treatments.

Representatives: E. M. Converse, C. C. Rausch, G. M. Massen, I. L. Yetman, B. E. Conley, T. F. Kittredge, and C. B. Smith.

●

DECKARD MANUFACTURING COMPANY
Tulsa, Oklahoma
Booth No. 91 Kansas Building

EXHIBIT: The company will display its regular line of beam hangers, grips and clamps, sucker rod racks and accessories, and Safety "C" links and snap hooks, as well as its allsteel tubing and rod boards and safety landings. These allsteel tubing and rod boards are manufactured in various sizes and types to suit various conditions, and are so designed that they comply with all federal and state safety laws, and are endorsed by safety committees, the makers state.

The "Safety Landing" is a small platform that can be attached to the derrick ladder at the proper place to make its deck or tread "flush" on top with the deck of the tubing or rod boards. A guard rail of regulation height encircles the landing.

A pumping derrick equipped with a Deckard allsteel tubing board, rod rack, rod board, and a safety landing at each board, provides workmen with the ultimate in safety and convenience.

Representatives: Hugh Robinson, L. C. Holloway, Fred W. Kessler, C. L. Deckard, and M. H. Rogers.

●

DEEP ROCK OIL CORPORATION
Tulsa, Oklahoma
Booths Nos. 29 and 30
Refiners and Marketers Building

EXHIBIT: The display will be of Deep Rock gasoline and motor oils.

●

THE DEHYDRO COMPANY
Tulsa, Oklahoma
Block 4 (outside)

EXHIBIT: New type oil-treating compounds, together with newest type of chemical pumps and feeders, will be displayed. Movies will be shown of various types of treating plants and equipment throughout the oil industry, which includes different types of treating systems; and the proper method of handling various treating problems also will be illustrated.

Representative: Harry S. Horton.

THE DELAVAL SEPARATOR COMPANY
Chicago, Illinois
Booths Nos. 61 and 61 Kansas Building

EXHIBIT: On display will be a Uni-Matic oil purifier for general lubricating and fuel oil purification, "High Speed" test tube centrifuge, and a special centrifuge for the separation of spent doctor emulsion. The latter centrifuge is a new development, constructed so that three discharges are made while the machine is in operation, making it continuous in its separation of the three principal components of spent doctor emulsions.

Representatives: D. A. Gardner, H. O. Sears, and N. E. Larsen.

●

DIAMOND CHAIN AND MANUFACTURING COMPANY
Indianapolis, Indiana
Booths Nos. 13 and 14
Scientific and Technical Building

EXHIBIT: Display will consist of finished steel roller chains in the single- and multiple-strand types, along with sprockets over which these chains operate; also flexible shaft couplings.

Representatives: J. L. Wamsley, Tulsa representative; W. A. Warrick, mechanical engineer; and W. B. Haislup, general sales manager.

●

W. S. DICKEY CLAY MANUFACTURING COMPANY
Kansas City, Missouri
Booth No. 111 Kansas Building

●

THE DILLON COMPANY
Tulsa, Oklahoma
Booth No. 106 Kansas Building

EXHIBIT: Will display Dillon couplings for grooved and plain-end pipe, tubing catcher and tubing lock in combination to prevent movement of tubing in pumping well; also used with packer to acidize and with bottom-hole adjustable choke.

Representatives: S. V. Dillon, president; and Kyle C. Havely, engineer.

●

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana
Booths Nos. 4 and 5 California Building

EXHIBIT: The booth will have as a background an enlarged photograph of the company's main machine shop. The photograph was enlarged from an 8-in. by 10-in. print to eight ft. in height by 18 ft. in length. The equipment displayed will consist of various Dodge clutches, bearings and drive units used extensively in the oil field and refineries.

Representatives: B. L. Myers and J. B. Miller from Dodge Manufacturing Corporation; and L. B. Holt, J. H. Drapier, and W. R. Davis of the Industrial Sales and Engineering Company, Houston, Texas.

●

DOWELL INCORPORATED
Midland, Michigan
Booths Nos. 26, 27, and 28
California Building

EXHIBIT: Will consist of a very attractive illustration of acidizing oil wells producing from a limestone formation. The display will include a visual demonstration of the importance of inhibited acid in acidizing and will portray the various applications of auxiliary chemicals such as a chemical Jelly Seal plug, intensified acid, emulsion preventing acid, film-penetrating acid, reduced surface tension acid and a chemical blanket for use ahead of the acid.

Such types of acid treatments as the Carr patented method, compound method, reverse compound method, packer and controlled flush method, gas well treatments by means of compressed gas and the application of Jelly Seal in these types of treat-

Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

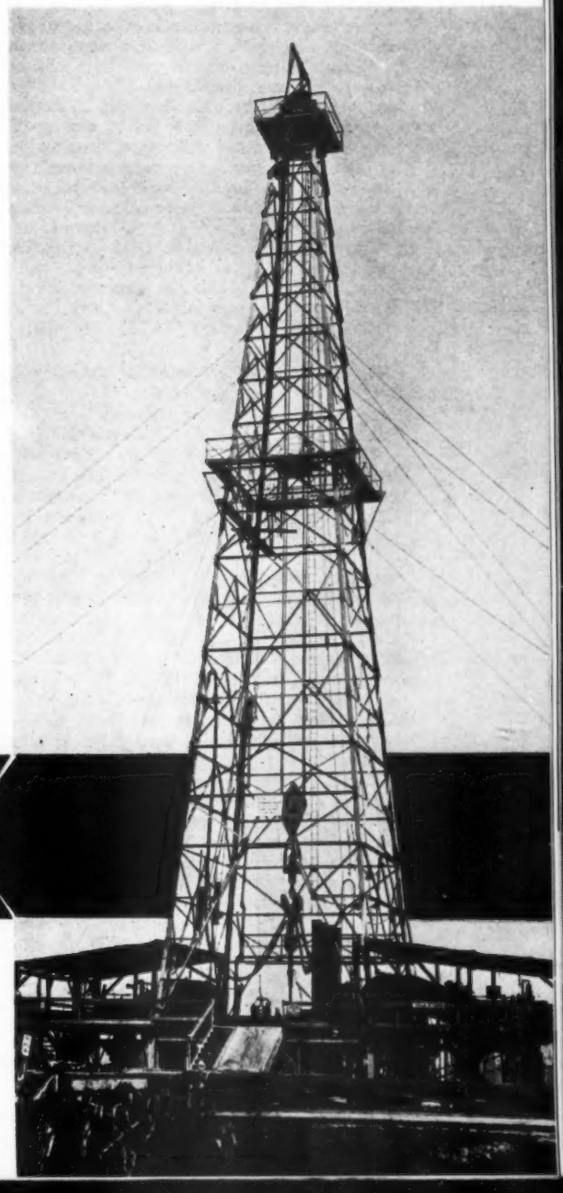
16-HOUR MILL-OUT in Grade "D" Casing at 10,860 Feet

RINGS THE BELL AGAIN FOR HOMCO SIDETRACKING TOOL!

The time required to mill out today's high-grade casing has been reduced from days . . . and weeks in some cases . . . to hours by HOMCO'S E&W SIDETRACKING TOOL, which recently milled out 30 lb. Grade "D" 7-in. casing at 10,860 feet in 16 hours at Abbeyville, La., the job pictured below. And this is one of many similar jobs where this tool has saved thousands of dollars in time alone for operators. Major companies all over like it . . . the field calls for it, by name; a compliment common to the many HOMCO Cutting and Fishing Tools especially designed to overcome special trouble jobs.

Briefly . . . how it works

The illustration tells its own story of how it cuts the pipe; not the whipstock. Note the wedge at bottom which locks the whipstock in place, preventing its rotation, and holds the directional bar parallel to the whipstock concave so the milling tool can't contact the whipstock. Note the automatic feed bar, which feeds the mill evenly and with precision as it cuts through the casing. A full-length window is assured every time. The automatic feed positively prevents overworking the tool. For full details, refer page 952, your 1938 Composite Catalog.



A COMPLETE STOCK OF OIL WELL SUPPLIES • MOST COMPLETE CUTTING AND FISHING TOOL SERVICE IN THE WORLD • A PROVEN LINE OF PICKED SPECIALTIES • MUD STOCKS AT CONVENIENT POINTS

HOMCO

CUTTING AND FISHING TOOL SERVICE
HOUSTON, TEXAS

BRANCH STORES: Beaumont, Kilgore, Wichita Falls, Victoria, Freer, Corpus Christi, Hebronville, Benavides, Odessa, Sam Fordyce, Texas; Shreveport, Lake Charles, New Iberia, Houma, Louisiana. • SALES OFFICE: Dallas, Texas.

ments, in the regular manner, the split Jelly Seal split column method, the Jelly Seal slug method, and the Jelly Seal float method will be illustrated.

These types of treatments will be illustrated in such a manner that either the layman or student will readily understand just how and why the various types of treatments were made.

Dowell Incorporated also has been asked to arrange a scientific display in the Scientific Hall, representing the acidizing phase of the oil industry.

Representatives: From Kansas: W. B. Tennis, Doyle Miller, J. A. Cummin, and Jack Sutherlin. From Oklahoma: B. E. Langley, W. J. Russell, John Mayfield, Art Townsend, and Jack Villines. From Texas: J. I. McConnell, S. C. Morian, Fred Holland, R. L. White, and O. W. Lyons. From Illinois: J. H. Courtner. From the general office: N. R. Crawford, J. G. Staudt, W. E. Reardon, R. D. Shaw, H. W. Ross, J. H. Adkison, G. F. Williams, D. G. Hefley, P. E. Fitzgerald, P. J. Lehnhard, Dr. John Stone, L. D. Smithers, and M. W. Frack. The following men from The Dow Chemical Company, the parent company, also will attend: Willard Dow, A. P. Beutel, L. W. Lee, C. Penhaligen, Millard Hooker, R. L. Curtis, L. I. Doan, Dr. L. C. Chamberlain, Dr. Grebe, Dr. Prutton, and Dr. Veazey.

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S. R. DRESSER MANUFACTURING COMPANY

Bradford, Pennsylvania

Booths Nos. 54 and 55 Kansas Building

EXHIBIT: A complete exhibit of Dresser pipe couplings and repair devices for the construction and maintenance of pipe lines will be shown. Included will be Dresser steel couplings, fittings, repair clamps, and repair sleeves. An interesting feature of the exhibit will be an actual demonstration of a flexible pipe joint. A pipe line will be maintained at a pressure of 100 lb. per sq. in. and a joint on this line will be moved up and down through a 4-deg. arc by an eccentric. A counter will record the number of deflections, which on previous exhibits has run as high as 625,000 before the show closed. It is called the pipe joint that "lives and breathes."

Representatives: M. N. Davis, executive vice-president; H. P. Boncher, sales manager; C. T. Davis, district manager; J. E. B. Gibbons, district manager; and H. R. Shidel, district manager oilfield division.

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THE DUFF-NORTON MANUFACTURING COMPANY

Pittsburgh, Pennsylvania

Booths Nos. 62 and 63 Oklahoma Building

EXHIBIT: The following equipment will be displayed: The new Duff-Norton air motor power jack, pipe forcing jack (double-acting geared type), automatic geared lowering jack, genuine Barrett double-action circle jacks, self-lowering governor-controlled jack, crank lowering jacks, speed-controlled jacks, inverted bridge jack, horizontal jack, screw jacks (ball bearing and cone bearing), automatic lowering genuine Barrett ratchet jacks, 4-way chain jack, automotive jacks, traversing jacks, bell bottom screw jacks, telescope screw jacks, cable reel jacks, pushing and pulling jacks, and steel trench braces.

New and improved equipment shown:

An interesting feature of this exhibit will be a working model of the new Duff-Norton air motor power jack. This compact, portable, heavy-duty power jack is equipped with a rotary air-motor that operates 25 to 50 percent faster with ordinary shop air pressure, according to the manufacturers, yet consumes no more air per unit of work despite its high efficiency, and is built in capacities from 25 to 100 tons.

Duff-Norton double-acting circle jack with extra wide flange; the new Duff-Norton geared type pipe pulling and pushing jack is capable of pushing or pulling pipe up to 6 in. in diameter without ditching or tunnelling and without changing the position of the jack, it is stated.

Representatives: C. N. Thulin, vice-president; and H. C. Gardner, assistant sales manager.

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E. I. DU PONT DE NEMOURS AND COMPANY, INC.

Wilmington, Delaware

Booths Nos. 159, 160, 161, 162, 163, and 164 Oklahoma Building

EXHIBIT: An exhibit depicting the contributions of the chemical manufacturing industry to the petroleum industry will be shown. The display will consist of a series of booths, tied together by an over-all canopy and flanking a large central lounge that will serve as a focal point of the section.

Six divisions, each representing a phase of the industry, make up the exhibit, in addition to the lounge. All will feature dramatized interpretations of the products presented, making use of animated charts, miniature process operations and special lighting effects. All operations and models shown will be fully authentic.

The American Glycerin Division exhibit will demonstrate the lowering of the explosive into a well by means of miniature reeling equipment. A large photo-mural showing the process is in the background, and an assortment of torpedos, bombs, and squibs for well-blasting will be shown.

The booth given over to explosives for seismic exploration will feature an action device tracing the progress of the entire operation. An enlarged picture, representing a cross-section through the ground being prospected, forms the screen of this display, with "chaser lights" indicating the path of the sound waves that go through the earth following the explosion, rebounding to a recording mechanism on the surface when they strike the stratum of shale being sought. A small model of laboratory testing apparatus also will be installed.

The Finishes Division booth will show, by means of a large photomontage and lighted arrows, the ways in which finishes serve the petroleum industry. Test panels, which determine the effects of various conditions of exposure, will be exhibited on the display platform.

Petroleum chemicals will occupy another panels devoted to gasoline colors, anti-oxidants, and extra-pressure lubricating bases. Various displays of auxiliary chemical products will be on the platform.

Neoprene chloroprene rubber will be represented in two sections, one pertaining to its use in oil production and the other in its application to marketing. The producing exhibit will use two miniature oil derricks against a painted backdrop, one derrick being in motion to show oil pressure-drilling with a neoprene rotary hose. Equipment in which the material is used, such as pistons, packers, oil-savers, valve seats, and other products will be shown.

The neoprene marketing section will make use of tri-plane revolving pictures, showing the place of neoprene hose in loading tankers, in the service station, and in delivering fuel oil to the home.

In the central lounge will be a display of the 12 products developed during the last ten years, which, according to a recent statement by Lammot du Pont, president of the company, accounted for 40 percent of the sales volume last year.

DURAMETALLIC CORPORATION

Kalamazoo, Michigan

Booth No. 7 Texas Building

EXHIBIT: Durametallic packing will be shown, calling attention especially to Grade D-10, the hot-oil packing. Also exhibited will be Dura Plastic packings, stressing especially the value of styles Dura Plastic B-1000 and Dura Plastic D-1000. The new mechanical seal called Dura Seal should attract considerable attention, as there will be a working model running in the center of the exhibit. Another product to be shown is the Dura Hooks or packing pullers. These are all-steel flexible packing removers.

Representatives: W. D. Emery, Tulsa, Oklahoma; Allison Walker, St. Louis, Missouri; and T. Braden and Ralph Morgan, Kalamazoo.

●

THE EAGLE-PICHER SALES COMPANY

Cincinnati, Ohio

Booths Nos. 254 and 255 Oklahoma Building

EXHIBIT: Eagle Super "66" plastic insulation will be featured. The display also will include Eagle blankets, Eagle "77," Eagle lead wool, Eagle oil-well plugs, Eagle Dreadnaught bearing metal, Eagle Outlasta bearing metal, and Eagle Durable bearing metal.

Representatives: Clyde Lynde, Glen J. Christner, J. J. Harutun, Wm. Hale, H. M. Aber, and F. W. C. Bailey.

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EASTMAN OIL WELL SURVEY COMPANY

Dallas, Texas

Booths Nos. 44 and 59

Scientific and Technical Building

EXHIBIT: Will show complete line of oil-well surveying and controlled directional-drilling equipment.

Representatives: R. F. Bolton and Stafford Park.

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THE EDWARD VALVE AND MANUFACTURING COMPANY, INC.

East Chicago, Indiana

Booths Nos. 37 and 38 Kansas Building

EXHIBIT: A complete line of valves will be displayed, including forged-steel stop valves; check valves; boiler stop valves; hydraulic valves; non-return, feedline stop-check, and blow-off boiler valves; relief valves; and straight-through valves. In addition, the Edward forged-steel strainer will be shown.

Representatives: W. W. Crawford, president; J. E. McDonald, sales manager; W. F. Crawford, vice-president; and W. W. Mohr, chief engineer.

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ELECTRIC HOSE AND RUBBER COMPANY

Wilmington, Delaware

Block C (outside)

EXHIBIT: Complete display of all types of hose for the refining and marketing divisions of oil companies. It will include several interesting new developments in hose for handling petroleum products, including the latest types of synthetic rubber hose.

Representatives: V. W. Wells, Chicago, branch manager; and George T. Hamann, southwestern representative.

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ELECTRIC SUPPLY COMPANY

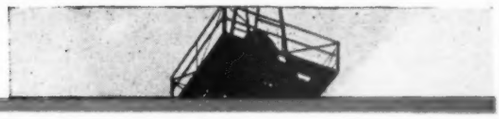
Tulsa, Oklahoma

Booth No. 20 California Building

EXHIBIT: A general line of electrical supplies and equipment for the oil industry will be shown.

Representatives: R. C. Stueve, R. E. Newhouse, O. F. Shaw, F. W. Stolba, J. C. Bond, and C. C. Boyer.

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.



MANUFACTURER OF WIRE LINES

IT TAKES A LOT of repeat orders from satisfied customers to build leadership and hold it. And it takes top performance to keep customers coming back for more, time after time. Only a product that is made of the highest quality materials by men who know how, can attain and keep this position of leadership.

The long list of customers who repeatedly specify American Tiger Brand Wire Lines proves that this product gives the kind of service that users want. We have encouraged users of American Tiger Brand Wire Lines to keep ton-mile service records because we know that where this has been done the result has always been further proof of the service and economy our product offers.

Remarkable service records are being made by our Excellay Preformed Rotary Lines. In Excellay Preformed lines a more even distribution of load is secured due to an absence of internal stress. Preformed wire lines have already built a reputation for long life, freedom from kinks, resistance to fatigue, ease and safety in handling, and simplicity in splicing. There is a type and grade of American Tiger Brand Wire Lines exactly suited to every need.

ELECTRICAL WIRES AND CABLES We manufacture a complete line of electrical wires and cables for the oil fields, some of which are: Amerclad All-Rubber Cords and Cables—including oil-proof and oil-resisting types. Ampyrol Insulated Wires and Cables. Amerbestos Cords, Cables and Magnet Wire. Geophone and Seismograph Cables. Rubber Covered Wire. Reliance URC Weatherproof Wire. Motor Leads and Switchboard Wires.

See Our Exhibit
INTERNATIONAL
PETROLEUM
EXPOSITION
TULSA
MAY. 14-21
OUR EDUCATIONAL and informative exhibit at Tulsa, Oklahoma, will occupy spaces 143-150 inclusive. It is a demonstration of how modern steels, wire lines and electrical wires and cables have played an important part in present day operations.

American TIGER BRAND Wire Lines

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY, Russ Building, San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

ELLIOTT COMPANY
Jeannette, Pennsylvania

Booth No. 126 Kansas Building

EXHIBIT: The exhibit will feature tube cleaners, in particular a 11½-ft. model. Inside the body of the large tube cleaner a rotating illuminated table will bring to view six displays of various sizes and types of tube cleaners built especially for the oil refinery. Further exhibits will show the component parts of various tube cleaners and tube cleaner accessories, such as operating hose, brush attachments, various universal joints, drills, etc. Elliott power plant equipment, such as steam turbines, steam engines, turbine generators, condensers, steam jet ejectors, deaerating feed-water heaters, etc., will be shown by means of photographic enlargements, some being illuminated transparencies in the background of the exhibit and the rest being pages of a mechanical book automatically operated.

Representatives: J. N. McClure, Tulsa, Oklahoma; W. E. Widau, Kansas City, Missouri; H. A. Hearn, Kansas City; V. H. Peterson, Omaha, Nebraska; H. A. Pahren, St. Louis, Missouri; H. W. Honefenger, St. Louis; and G. L. Elliott, Springfield, Ohio.

ELLIOTT MANUFACTURING COMPANY
Los Angeles, California

Booth No. 64 Oklahoma Building

EXHIBIT: The following equipment manufactured by the company will be on display: Elliott rotary hose clamps, swivel connections and adapters, return bends, hose connections, safety chains, and special machines used for rotary hose service.

Representative: Ray W. Elliott.

EMSCO DERRICK & EQUIPMENT COMPANY
Los Angeles, California

Booths Nos. 102, 103, 114, and 115 Kansas Building

Also Exhibiting with Continental Supply Company

EXHIBIT: Display will be of Emsco portable pumping units, and Emsco power and steam pumps.

Representatives: E. M. Smith, G. W. Walton, L. W. Stahl, and S. W. Webster.

THE ENGINEERING COMPANY
Tulsa, Oklahoma

Booth No. 117 Oklahoma Building

EXHIBIT: Rod hangers, Teco shock absorbers, and a full line of other patented products will be on display.

Representatives: Frank Rudrow, C. A. Mathey, John Eaton, and Dave Collins.

THE ENSIGN CARBURETOR COMPANY, LTD.
Los Angeles, Chicago, Dallas

Booth No. 42 California Building

EXHIBIT: Gas, combination gas and gasoline, and butane carburetors and equipment will be displayed. Several makes of engines operating on butane in the outdoor exhibits will have Ensign carburetor equipment.

Representatives: Gilbert Woodill, sales manager, and L. C. Arter, Dallas branch manager.

EVERLASTING VALVE COMPANY
Jersey City, New Jersey

See W-K-M Company Exhibit

THE EXNER-DODGE PACKER COMPANY
Coffeyville, Kansas

Booth No. 35 Oklahoma Building

EXHIBIT: Equipment will include oil and gas well packers (emphasis upon the Underset Formation Packer), swaged nipples, bull plugs and other fittings made from new pipe, Lube-Pack stuffing boxes, wire rope splicing needles, casing and drive shoes, Crumbie tubing tongs, and welded all-steel casing wagons.

Representatives: Glen Brandon, Thomas E. Brandon, F. S. Denison, R. E. Fulkerson, Jesse H. Graham, W. S. Leake, and G. N. Purcell.

THE FAFNIR BEARING COMPANY
New Britain, Connecticut

Booths Nos. 67 and 68 Kansas Building

EXHIBIT: A complete line of ball and roller bearings will be displayed.

Representatives: A. L. Maltman, G. W. Tompkins, W. S. Shirley, and T. A. Brown.

GEORGE E. FAILING SUPPLY COMPANY
Enid, Oklahoma

Block O (outside)

EXHIBIT: Exploration drilling equipment will be on display.

Representatives: George E. Failing, J. C. Failing, Tweed E. Failing, E. L. Alexander, Al. Braithwaite, W. H. Van Valkenburg, Pat M. Holden, and W. T. Caldwell.

FAIRBANKS, MORSE AND COMPANY
Beloit, Wisconsin Chicago, Illinois

Booth No. 170 Oklahoma Building

See also Continental Supply Company Exhibit

THE FALK CORPORATION
Milwaukee, Wisconsin

Exhibiting with Continental Supply Company

FARRAR AND TREFTS, INC.
Buffalo, New York

Exhibiting with Continental Supply Company

FARRELL-BIRMINGHAM COMPANY, INC.
Buffalo, New York

Booth No. 76 Kansas Building

EXHIBIT: Sykes herringbone gear generators, Gearflex couplings, Manger flexible couplings, and instruments for measuring gear teeth will be displayed.

Representative: John Brandt, sales engineer.

FISHER GOVERNOR COMPANY
Marshalltown, Iowa

Booths Nos. 88 and 89 Texas Building

EXHIBIT: Display will consist of a complete line of automatic pressure controls, including pump governors, pressure-reducing and pressure-relief valves, liquid level controllers, including the new Fisher averaging type pilot control unit, and the new tubular float type liquid level controller; also a new development in the gas industry, the Fisher King gas-pressure booster, and complete line of gas-pressure controls.

Representatives: P. A. Elfers, sales manager; C. D. Peterson, Mid-Continent district manager; R. S. McKeever, representative in the Oklahoma area, and also a representative from the M. N. Dannenbaum Company, Houston, John H. Carter, jr.; and a representative from the Uhrich Supply Company.

GEO. J. FIX COMPANY
Dallas, Texas

Booths Nos. 9 and 10 Texas Building

EXHIBIT: The Geo. J. Fix Company is oil-field representative for the Baldwin-Duckworth Chain Corporation and equipment displayed will be that manufactured by the latter. For details of equipment to be shown, as well as those who will be in attendance, see listing under Baldwin-Duckworth Chain Corporation.

FLUID PACKED PUMP COMPANY
Los Nietos, California

Booths Nos. 130 and 131 Kansas Building

EXHIBIT: Display will consist of several mounted models of oilwell pumps; also a complete display of dismantled pumps, and a working model showing the action of a Groove-seal pump in operation.

Representatives: E. Kent Springer, engineer, Los Nietos; Clyde Ellwood, manager of the Fluid Packed Pump Company, Mid-Continent District; and Robert J. Miller, Houston, Texas, Gulf Coast representative.

FOOTE BROS. GEAR AND MACHINE CORPORATION
Chicago, Illinois

Booths Nos. 52 and 53 California Building

EXHIBIT: Several sizes of single- and double-reduction oil-well pumping speed reducers, one unit assembled with ¼-hp. 1750-r.p.m. motorized reducer to drive the gear box, cover to be removed during the exhibit to show the operation of the parts and lubricating system. Also on display will be heavy-duty Agitator drives, with the shaft in vertical position on top of which will be mounted a cable on which will be displayed the various forms of the company's industrial type reducers. This unit will be in operation and the table will be revolved at about the rate of one or two revolutions per minute.

Representatives: F. A. Emmons, vice-president and general sales manager, Chicago, Illinois; Max E. Landry, Tulsa, Oklahoma, representative; Ray E. Riddle, his assistant; George J. Fix, representative, Dallas, Texas.

THE FOUR WHEEL DRIVE AUTO COMPANY
Clintonville, Wisconsin

Space E, Block N (outside)

EXHIBIT: Two trucks will be exhibited, the six-wheel drive unit, with Frank's portable well-drilling unit mounted on it, and the four-ton chassis.

Representatives: H. T. Francis, district sales manager, and his assistant, W. C. Merrill; R. H. Schmidt, general sales manager, and Walter A. Olen, president and general manager.

THE FOXBORO COMPANY
Foxboro, Massachusetts

Booths Nos. 4 and 5 Scientific and Technical Building

EXHIBIT: Will have an operating exhibit, which will include a demonstration of the new Foxboro system of pneumatic remote transmission. This development enables an operator to centralize his control panel and still keep the actual controlling instrument at the most desirable location, near the process. An instrument panel for complete pipe still control will be another feature. In addition there will be on display other Foxboro indicating, recording, and controlling instruments for the petroleum industry.

Representatives: G. B. Lane, manager, Dallas, Texas, branch office; J. B. McMahon, manager, Control Division; C. L. Bryan; H. G. Griffith; and L. W. Parten.

THE FRANCE PACKING COMPANY
Tacony, Philadelphia, Pennsylvania

Booth No. 86 Oklahoma Building

EXHIBIT: A complete line of metallic packings for use on all types of engines and compressors will be shown.

Representatives: James A. McPeak, president, and Joseph M. Fuller, Mid-Continent representative.

CHAS. J. FRANKS COMPANY
Tulsa, Oklahoma

South of Grounds Office (outside)

FRANKS MANUFACTURING CORPORATION
Tulsa, Oklahoma

Block Z (outside)

EXHIBIT: On display will be a Model

THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending Exposition. Register immediately on arrival.

PRODUCTION UNHAMPERED

Fig. 2. Showing well head (in circle) of well equipped with a Kobe pump that continued pumping during the entire storm except for a short interruption of electric power service.

KOBE

That Kobe is the safest and best method of producing oil wells in localities where high water or other hazards might endanger production and equipment, was forcefully evidenced in a field which suffered serious damage during the recent storm and flood which swept through Southern California.

Wells in this area are located in and tributary to the river bed. The large volume of water that engulfed the field, and its terrific force, are clearly shown by the illustrations reproduced here.

Figure 2 shows a well produced with a Kobe pump which continued to pump oil during the entire storm except for a short interruption of the electric power service, although tubing was badly bent and forced out of position.

Figure 3 shows a well that had been undermined and the rig destroyed, after the flood had subsided. Figure 1 is the same well after a new derrick had been erected. The Kobe pump producing this well withstood this terrific onslaught of water, silt and debris without damage; safeguarding the well and production. Tubing at the well head was badly bent, but it held securely. When straightened and one nipple replaced, the power was turned on and the pump operated perfectly. Production was resumed, and no pulling job was required.

For hazardous localities of this character, the Kobe surface unit can be located at any point outside the danger zone. No equipment that usually is endangered by flood conditions is installed at the well. The result is ultimate safety for the well, production and equipment, and the elimination of costy foundations required by conventional pumping equipment.

Fig. 4. The tremendous force of the flood and the large deposits of silt left in the wake are clearly shown.

Fig. 7. The river of raging waters that left only destruction in its wake.

KOBE, INCORPORATED
(Pronounced KŌ-B)
3040 East Slauson Avenue, Huntington Park, California
Branch Office: 3119 South Robinson Avenue, Oklahoma City, Oklahoma

HYDRAULIC PUMP

5000 Diesel-powered 100 percent portable rotary drilling outfit; and a line of truck motor-driven well-servicing units.

Representatives: Carl White, R. M. White, H. H. Franks, L. D. Hopkins, field service men and plant representatives.

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FRICK COMPANY
Waynesboro, Pennsylvania
Booths Nos. 30 and 31 California Building

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FRICK-REID SUPPLY CORPORATION
Tulsa, Oklahoma
Block 1 (Drake Drive)

EXHIBIT: Equipment of the following manufacturers will be displayed: Beaumont Iron Works Company, Joseph Reid Gas Engine Company, Republic Rubber Division, Lee Rubber and Tire Corporation, Midwest Piping and Supply Company, Inc., Axelson Manufacturing Company, Linear Packing and Rubber Company, Inc., Jensen Bros. Manufacturing Company, The Raybestos Division of Raybestos-Manhattan, Inc., National Transit Pump and Machine Company, Unaweld Manufacturing Company, Whitlock Cordage Company, The Wood Shovel and Tool Company, J. P. Ratigan, and Revere Copper and Brass, Inc.

Representatives: Frick-Reid representatives who will be on duty at various times during the Exposition or who are going to visit Tulsa during this show are as follows: Wm. M. Patterson, president, Pittsburgh, Pennsylvania; R. T. Frick, vice-president and treasurer, Pittsburgh; J. L. Shakely, vice-president, Tulsa, Oklahoma; Robert McCoy, jr., sales manager, Tulsa; H. H. Wilson, assistant sales manager, Dallas, Texas; V. V. McGrew, district sales manager, Houston, Texas; H. C. White, district sales manager, Shreveport, Louisiana; F. J. Kopp, district sales manager, Fort Worth, Texas; A. G. Bastian, district sales manager, Longview, Texas; J. W. Kaye, assistant district sales manager, San Antonio, Texas; A. L. Henderson, district sales manager, Odessa, Texas; L. J. Davis, district sales manager, Hutchinson, Kansas; A. A. Hopper, district sales manager, Bartlesville, Oklahoma; H. D. Stanley, district sales manager, Ardmore, Oklahoma; H. L. Wilkins, district sales manager, Clay City, Illinois; George L. Reid, manager machinery sales, Tulsa; O. C. Staples, machinery sales, Tulsa; L. G. Sutter, machinery sales engineer, Tulsa; A. C. Frampton, machinery sales engineer, Tulsa; V. C. Canter, refinery sales engineer, Tulsa; Fred Hammett, refinery sales, Tulsa. In addition, there will be a large number of other Frick-Reid employees on duty during the Exposition. Representatives of manufacturers who will exhibit with Frick-Reid Supply Corporation will include the following: N. G. Nuttall, Beaumont, Texas, Beaumont Iron Works Company; John Reid, Oil City, Pennsylvania, Joseph Reid Gas Engine Company; N. M. Grove, Tulsa, Oklahoma, Republic Rubber Division, Lee Rubber and Tire Corporation; Mr. Simon, Tulsa, Midwest Piping and Supply Company; D. M. Hammett, Tulsa, Axelson Manufacturing Company; W. C. Fisler, Tacony, Philadelphia, Pennsylvania, secretary-treasurer, Linear Packing and Rubber Company, Inc.; W. G. and K. R. Jensen, Coffeyville, Kansas, Jensen Bros. Manufacturing Company; Mr. Kinsey, St. Louis, Missouri, The Raybestos Division of Raybestos-Manhattan, Inc.; C. H. Forster, Oil City, Pennsylvania, vice-president and general manager, National Transit Pump and Machine Company; W. B. Baker, Cleveland, Ohio, general manager, Unaweld Manufacturing Company; E. W. Brown, Chicago, Illinois, western manager, Whitlock Cordage Company; Dan M. Bell, Dallas, Texas, The Wood Shovel and Tool Company; J. P. Ratigan of J. P. Ratigan, Los Angeles, California; and Russ Weil, Dallas, Revere Copper and Brass, Inc.

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GARDNER-DENVER COMPANY
Quincy, Illinois
Exhibiting with Continental Supply Company

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THE GARLOCK PACKING COMPANY
Palmyra, New York
Booths Nos. 59 and 60 Texas Building

EXHIBIT: Various items of mechanical packing used in the oil fields will be on display, featuring the Garlock Klozure, a sealing element for use on revolving shafts in connection with liquids or semi-liquids—water, oil, grease, or chemicals. Another product to be featured is Garlock Chevron, a sealing unit for use on reciprocating shafts. Also on exhibit will be metal packings for use on revolving or reciprocating shafts at high pressures, and a number of fibre, metallic, plastallics, and plastic packings for a wide variety of uses.

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GASO PUMP AND BURNER MANUFACTURING COMPANY
Tulsa, Oklahoma
Block W (outside)

EXHIBIT: All types of reciprocating power pumps manufactured by the company will be on display. A new 12-in. stroke, heavy-duty, large-capacity reciprocating pump will be introduced at the Show.

Representatives: T. J. Flanagan, president; M. J. Flanagan, vice-president; L. D. Armstrong, secretary-treasurer; H. F. Stover, assistant treasurer and purchasing agent; T. H. Flanagan, sales department; H. A. Wienecke, jr., sales engineer; G. A. Dreyer, sales engineer; R. L. Jaeger, mechanical engineer; and Russell Peoples, mechanical engineer; Russell Peoples, salesman; and Irving C. Hughlett, shop superintendent.

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GATES HARDWARE COMPANY
Tulsa, Oklahoma
Block 4 (outside)

EXHIBIT: Oil-field and machine-shop hardware including Crescent tools, Greenfield tools, Mac-it screws, Lufkin tapes and rules. Everyready Prestone and batteries, Fox shovels, Texaco roofing, Yale and Master padlocks, Plumb and Kelly axes, Pennsylvania lawn mowers, Allen oil-field cans, Trimo and Ridgid wrenches, Erie vises, Simplex jacks, Delta and Ecolite lanterns, Tru-Temper steel goods, Toledo pipe tools, Spartan and Atkins saw blades, Disston saws, Hall augers, Black and Decker power tools, Nesco galvanized ware, and Nicholson files.

Representatives: F. E. Gates, president; W. C. Gates, treasurer; G. H. Gates, secretary; F. R. Brooks, A. W. Coulter, C. E. De Verse, H. E. Fitzer, R. M. Gump, C. R. Pendleton, F. C. Robbins, C. B. Chancellor, and T. L. Robbins.

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THE GATES RUBBER COMPANY
Denver, Colorado
Booths Nos. 56 and 57 California Building

EXHIBIT: Will display Vulco rope (industrial V-belt) drives, industrial hose, and molded rubber goods for the petroleum industry. The Vulco rope drives will be demonstrated by means of a large display machine.

Representatives: T. D. Williamson, C. F. Dagwell, P. Castholm, F. L. Craig, E. Davis, M. S. Jeffreys, D. L. Kessler, T. White, and others.

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GATKE CORPORATION
Chicago, Illinois
Booths Nos. 23, 24, and 25 California Building

GEARENCH MANUFACTURING COMPANY
Houston, Texas
Booths Nos. 36 and 37 Texas Building

EXHIBIT: Will display a complete line of Petol and Titan tongs, for use on drilling, producing, refining, plumbing, pipe line, and machine-shop work.

Representatives: C. E. Olsen, president and general manager; W. T. Olsen, vice-president; and M. T. Kappele, Oklahoma and Kansas sales representative.

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GENERAL ELECTRIC COMPANY
Schenectady, New York
Booths Nos. 100, 101, 116, and 117 Refiners and Marketers Building

EXHIBIT: Exhibit will consist of the following equipment, grouped according to the phase of the petroleum industry in which it is applied:

Production: Splash-proof electric motors and weather-proof control, rapid-reversing motor, transformers, time switches, and generator-voltage regulators.

Transportation: Portable arc-welding equipment, and pipe-line pumping motor.

Refining: Explosion-proof motors and control, mechanical-drive steam turbine, and instruments.

Marketing: Fractional hp. explosion-proof gasoline-pump motor, and mercury-incandescent filling station floodlights.

Representatives: W. G. Taylor, Schenectady, New York; L. T. Blaisdell, Dallas, Texas; R. T. Shiels, Dallas, Texas; G. R. Prout, Dallas, Texas; C. A. Maas, Dallas, Texas; F. B. Hathaway, Oklahoma City, Oklahoma; R. Randall, Oklahoma City, Oklahoma; J. T. Hockaday, Houston, Texas; G. W. Curry, Houston, Texas; A. L. Jones, Tulsa, Oklahoma; E. F. Patterson, Tulsa, Oklahoma; R. G. Smith, Tulsa, Oklahoma; and R. L. Smallman, Schenectady, New York.

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GENERAL PAINT CORPORATION
Cleveland, Ohio
Booths Nos. 38 and 39 Texas Building

EXHIBIT: The following will be displayed and demonstrated: (1) the Hill Hubbell method of pipe protection as applied to both exterior and interior of steel pipe; (2) Biturine protective coatings for iron and steel; (3) Industrakote color finishes for equipment and oil country machinery; and (4) technical paints and varnishes for specialized oil industry use.

Representatives: W. D. (Bill) Teubner, vice-president in charge of Mid-Continent Division, Tulsa, Oklahoma; Ralph H. Nackerud, assistant sales manager; Ainslie Perrault, manager petroleum sales; Ken Keating, chief chemist; Ray Gunn, industrial sales representative; and Lewis Perrault, protective coating representative.

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GENERAL POWER, INC.
Quapaw, Oklahoma
Block 103 (outside)

●

GEORGE VALVE COMPANY
Saegertown, Pennsylvania
Booth No. 3 Kansas Building

●

L. H. GILMER COMPANY
Tacony, Philadelphia, Pennsylvania
Booth No. 47 California Building

EXHIBIT: Products on display will include Gilmer multiple V-belts, and Kable Kord flat belting in both endless belts and roll belting for oil-field equipment.

Representatives: A. B. MacFarland from the factory; D. A. Cant, Fred Sintes, jr., and C. P. Williams, district managers of Oklahoma, Louisiana, and Texas, respectively.

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.

GLOBE OIL TOOLS COMPANY
Los Nietos, California

Booth No. 31 — Texas Building

EXHIBIT: Equipment to be displayed:

Drilling bits for all formations, including the Globe rock bit, the Globe Type B four-way bit, the new three-way and four-way pin and box-type bits, and the Type B-3 and Type M-5 detachable cutter bits.

Coring equipment for hard and soft formations, Types E and ER.

For underreaming, the Globe Type U, roller cutter rotary underreamer.

For fishing, the Globe basket bit.

For opening up rat hole, the Globe Type D removable cutter redrill bit.

The exhibit will also include a full set of working models of Globe tools.

Representatives: L. C. Bodemann and I. Frank Brown.

●

GOODYEAR TIRE AND RUBBER COMPANY
Akron, Ohio

See Gustin-Bacon Manufacturing Company Exhibit

●

GRANT OIL TOOL COMPANY
Los Angeles, California

Booths Nos. 257 and 258 — Oklahoma Building

EXHIBIT: Grant roller cutter reamers, Grant underreamers, Grant wallscrapers, Grant pump liner puller, Grant hydrostatic bailer, Grant hydrostatic perforation cleaner, and other equipment will be shown.

Representative: John Grant, president.

●

GRAY TOOL COMPANY
Houston, Texas

Exhibiting with Kerotest Manufacturing Company

●

THE GUIBERSON CORPORATION
Dallas, Texas

Booths Nos. 216, 217, 218, 233, 234, and 235 — Oklahoma Building

EXHIBIT: The following tools will be displayed:

Of interest to the production man—swabs, types "K", "E", "A", "H", and "F", and plain and swivel rope sockets; wire line oil savers; sucker rod strippers; tubing catchers, types "E", "B", and "C", and tubing catcher anchors; tubing spiders, heavy and medium; floor blocks, types "A-1" and "B"; control head packers, types "C-1", "G-1", "G-2", "GT", "GL", and "GA"; valveless packers, types "F" and "H"; and spiral tubing and casing packers and spiral bottom water plugs.

Equipment for tubing wells under pressure—tubing strippers; Type "B-1" oil savers; Type "C-2" oil savers; and Type "D" oil savers.

Equipment for drilling-in wells under pressure—types "A" and "B" friction kelly drives; Type "E" drilling head; tubing strippers; Type "B-1" oil savers; Type "C-2" oil savers; and Type "D" oil savers.

Gas-lift equipment—Type "B" flow valve, and Type "A" intermitter.

New Guiberson P. L. rotary high-pressure pumps, of interest to pipe line and refining men.

Guiberson equipment new to the industry—

Rotary pump: The advantages of the new high-pressure rotary pump are given as follows: (1) direct drive by motor or engine, eliminating reduction gears or V-belt drives; (2) minimum number of wearing parts; (3) only one stuffing box; (4) high volumetric and overall efficiencies at pressure to 1000 lb. or more; (5) operation at sustained high speeds and pressures; (6) non-pulsating discharge; (7) no trapping; and (8) light weight and portability.

Type "D" drilling head: This new drilling head was designed for use in drilling-in wells under pressure. The construction of the rubber is such that it packs off around the standard square kelly while drilling and around the drill pipe and its collars when the drill stem is being run in or removed from the well, thus eliminating the necessity for using two separate tools for this purpose. The drilling head is designed for working pressures to 1500 lb. and is provided with gland adjustment for taking up for wear.

Types "C-1" and "G-2" packers: The Type "C-1" Packer is of the single Neoprene rubber sleeve type, and the Type "G-2" is of the double Neoprene rubber type. Both packers have dovetailed, extra large, heat-treated alloy-steel slips. The packer assembly on both packers is interlocked with the anchoring device, which feature guarantees the holding open of the control valve when running-in, the makers state.

Representatives: S. A. Guiberson, jr., president; H. M. Haseltine, vice-president and general manager; Allen Guiberson, vice-president in charge of manufacture; Gordon G. Guiberson, sales manager; H. U. Garrett, assistant sales manager; Albert Pranger, chief engineer; Irving H. Buck, in charge of rotary pump sales; M. H. French, Oklahoma representative; R. E. Kenngott, Kansas representative; J. C. Owen, West Texas and New Mexico representative; and G. P. Thomson, East Texas representative.

●

GULF OIL CORPORATION
Houston, Texas

Booth No. 105 — Kansas Building

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GUSTIN-BACON MANUFACTURING COMPANY
Kansas City, Missouri

Booths Nos. 194 and 195 — Oklahoma Building

EXHIBIT: On display will be the Rolagrip Coupling, V-belt drives, filter units, fog nozzles, and mechanical rubber goods.

Representatives: J. F. Stephens, Kansas City; M. Shields, Kansas City; J. N. Sawyer, Kansas City; V. F. Halliburton, Kansas City; J. R. Higgins, Kansas City; W. W. Jones, Kansas City; Charles Wheatley, Kansas City; N. A. Wilson, Kansas City; H. M. Stone, Houston; H. E. Burtner, Fort Worth; S. M. Blevens, Tulsa; F. P. Monahan, Tulsa; and D. Chaney, Tulsa.

●

HALLIBURTON OIL WELL CEMENTING COMPANY
Duncan, Oklahoma

Block K (outside)

EXHIBIT: Display will feature oil-well cementing, oil-well acidizing, formation testing, floating equipment, measuring devices, F. W. D. and Halliburton trucks, and cementing accessories.

Representatives: C. P. Parsons, vice-president; and a number of representatives from various territories.

●

HANLON-WATERS, INC.
Tulsa, Oklahoma

Booths Nos. 83, 84, 85, 126, 127, and 128 — Texas Building

EXHIBIT: Victaulic Company of America will be represented in Booth No. 85, American Air Filter Company in Booth No. 84, and American Liquid Meter Company in Booth No. 126. Hanlon-Waters, Inc., are distributors for all three of these firms.

Equipment on display will be as follows:

Bassler positive displacement meters with samplers and other accessories, for the measurement of all liquids.

American air filters for engines and compressors and all industrial purposes.

Victaulic couplings for all pipe line work.

Hanlon-Waters oil and gas separators, load binders, boiler gauge cocks, boiler control units, a complete line of automatic control equipment for the control of liquids and pressures, including time control devices and other instruments ordinarily used in gasoline plants, refineries, pipe lines, and by production departments.

Representatives: W. K. Gregory, American Air Filter Company; R. W. English, Victaulic Company of America; Fred C. Farmer, American Liquid Meter Company; and the following from Hanlon-Waters, Inc.: M. F. Waters, Ches. Herndon, E. L. Hagar, L. J. Griffey, R. M. Hays, R. C. Koster, A. J. Foley, and G. N. LaMont.

●

HAPPY BELTING COMPANY
Tulsa, Oklahoma

Block 8 (outside)

EXHIBIT: Single and double reduction pumping units, known as the "Happy Pumper." These pumping units are of the chain reduction type, using Diamond extra-heavy roller chains. The cases are made of high-grade gray iron and the main bearings on the shaft are long bronze bearings, giving full support to the shaft. One of the special features of the unit is the interchangeability of the various hp. sizes. Also on display will be the Happy Durnell Timken-equipped Universal back-crank pumping unit and the Happy Cooler. This cooler is for the cooling of engine-jacket water for oilfield compressors and engines. In addition there will be a general line of transmission equipment, including pulleys, bearings, clutches, etc., displayed.

Representatives: P. E. Mahaffey, W. H. Gorey, A. F. Nixon, R. C. Lindley, A. M. Butcher, and L. C. King.

●

HARNISCHFEGER CORPORATION
Milwaukee, Wisconsin

Block L (outside)

EXHIBIT: Will have on display a new ¾-yd. excavator, Model 255 dragline. The design and construction incorporates the very latest of trends, including alloy steels, etc. Also will have on display a 300-amp. four-wheel mounted electric arc-welder, gasoline driven; a 200-amp., two-wheel mounted electric arc-welder, gasoline-engine-driven; a 200-amp. portable motor-driven electric arc-welder. A complete line of welding electrodes will be shown and the various methods of welding will be demonstrated.

An electric hoist, type "R-1", with variable speed push button control will form another part of the exhibit. This control is said to be an innovation to the operating of electric hoists. A Zip-Lift hoist, electrically-operated, having a lifting capacity of 500 lb., also will be displayed. P & H Zip-Lift hoists come in three sizes, 250-lb., 500-lb., and 750-lb. capacities. To complete the exhibit there will be a type DFS No. 201, 1½-kw., 125-volt electric lighting plant, gas-engine-driven, and complete with panel board, fuel tank, etc.; also one of the company's electric motors.

Representatives: G. K. Woodling, J. H. Enochs, C. Powell, R. L. Scollard, C. W. Daniels, and E. T. Slackford.

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HAYNES STELLITE COMPANY
Kokomo, Indiana

See Union Carbide and Carbon Corporation exhibit.

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HERCULES MOTORS CORPORATION
Canton, Ohio

Booths Nos. 76, 77, 78, 133, 134, and 135 — Oklahoma Building

EXHIBIT: Hercules will exhibit a very comprehensive display of its entire line of 2-, 4-, and 6-cylinder gasoline and natural gas engines and power units, as well as its

Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

4- and 6-cylinder Diesel engines and power units. The units will all be arranged specifically for oil field applications and will include the special accessories necessary for their proper operation under the condition in which they are required to operate in the oil fields.

Of particular interest, the makers believe, will be the modern, high-speed, heavy-duty Diesel engines, and on display will be the "DOOC" 4 by 4½, 4-cylinder unit, the "DJXC" 3¾ by 4½, 6-cylinder unit, the "DRXB" 4⅜ by 5¼, 6-cylinder unit and the "DHXB" 5 by 6, 6-cylinder unit, all of the high-speed, full Diesel type.

In addition, the many Hercules models now used in the oil fields for drilling, pumping, well-servicing, and pipe line applications will be on display.

Representatives: Exhibit in charge of A. B. Wehling. Others in attendance: Charles Balough, president; John Keplinger, vice-president; Fred Goldsmith, R. J. Scott, John Tidball, and Ray Lewis, all sales engineers.

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HERCULES TOOL COOMPANY
Tulsa, Oklahoma

Booths Nos. 55 and 56 Texas Building

EXHIBIT: Display will consist of tubing-heads, casingheads, tubing hangers, combination thread pumping and flowing tees, engine control valves, globe relief valves, tubing spiders, tubing anchors, casing swage nipples (overshots), and an unusual polished rod stuffing box.

Representatives: S. P. Tschappat, Harold Callahan, L. C. Rhoads, Joe Laley, and W. T. Swearengen.

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HINDERLITER TOOL COMPANY
Tulsa, Oklahoma

Block I (outside)

EXHIBIT: Will display a full line of pressure casingheads, rotary fluid pack-off tool joints, and slush-pump-operated overshots.

Representatives: Frank Hinderliter, Herman Hendershot, and all field and store men.

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THE CHARLES N. HOUGH MANUFACTURING COMPANY
Franklin, Pennsylvania

Booths Nos. 123 and 124 Texas Building

EXHIBIT: Oil-well pumping specialties will be displayed as follows:

Rod-type, cold-drawn tube insert cup pumps, as well as all metal pumps, which include Huf-Duo insert pump, Huf-Supersize insert pump, Huf-Stripper insert pump, Huf-Lewis insert plunger pump, and Huf-MTL pump.

One of the features of the display will be the different trade-named specialized balls and seats: "Repelex", stainless steel; "Kamonex", stainless monel alloy; "Steelex", alloy steel; "Bronzex", bronze alloy; "Resistex"; "Combinex"; and "Utilex".

Other items displayed will be cold-drawn seamless steel working barrels, and various types of working barrel valves.

The Williams lower valve puller will be displayed by the manufacturer, R. C. Williams and Company, Wayne, Ohio.

Representatives: C. O. Shumaker, sales representative, Wichita, Kansas; Frank L. Scott, sales representative, Tulsa, Oklahoma; A. M. Mallinson, sales representative, Wichita Falls, Texas; Harry A. Adams, sales representative, Big Spring, Texas; M. B. Coker, sales representative, Kilgore, Texas; Ed. Ross, sales representative, Shreveport, Louisiana; R. J. Folmar, sales representative, Houston, Texas; L. L. Reib, warehouse manager, Tulsa, Oklahoma; C. N. Hough, Franklin, Pennsylvania; and O. J. Thompson, Franklin, Pennsylvania.

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HUGHES TOOL COMPANY
Houston, Texas

Booths Nos. 211, 212, 213, 214, 215, 236, 237, 238, 239, and 240, Oklahoma Building

EXHIBIT: Practically all products of the Hughes Tool Company will be on display in a very interesting and comprehensive manner, featuring all recent improvements and developments in equipment of their manufacture, sectioned and illustrated that interior construction and workmanship may be viewed to best advantage. Products exhibited will include rock bits, core bits, tool joints, reamers, drill collars, chokes, tubing and flow heads, valves and fittings, complete assembled christmas trees, and other specialized oil industry tools.

Representatives: Prentiss Seale, manager Oklahoma and Kansas Division, will be in charge with an adequate staff of attendants to explain and demonstrate all improved features of Hughes tools. These men will include representatives of both the sales and engineering departments.

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HUTCHISON ENGINEERING WORKS
Chicago, Illinois

Booths Nos. 9 and 10 Texas Building

EXHIBIT: "Rumba" mud screen (or shale shaker), steam turbine generators, forge blowers, gasoline lighting plants, "Flolight" floodlights, steam turbines, and electric motors.

Representative: F. E. Hutchison.

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HYATT BEARINGS DIVISION
General Motors Corporation
Harrison, New Jersey

Booths Nos. 57 and 58 Texas Building

EXHIBIT: Display will show the extensive use of Hyatt roller bearings in pumps, rotaries, drawworks, blocks, engines, swivels, etc.

Representatives: C. L. Newby, manager, Hyatt Roller Bearing Sales Company, Chicago, Illinois; J. L. Haynes, division engineer, Hyatt Roller Bearing Sales Company, Chicago; F. H. Webster, sales engineer, Hyatt Roller Bearing Sales Company, Chicago; L. L. Hill, sales engineer, Hyatt Roller Bearing Sales Company, Pittsburgh, Pennsylvania; H. K. Porter, general sales manager, Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey, and H. M. Carroll, advertising manager, Hyatt Bearings Division, General Motors Corporation, Harrison.

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HYDRIL COMPANY
Los Angeles, California

Booths Nos. 21 and 22 California Building

EXHIBIT: The following equipment will be displayed:

Hydril Type "F" joint for external flush drill pipe.

Hydril Type "I.F." joint for internal flush drill pipe.

Hydril Type "E.I.U." joint for external and internal upset drill pipe.

Hydril Type "F.J." joint for internal and external flush casing.

Hydril Type "E.U." joint for external upset casing.

Hydril Type C.P. blow-out preventer.

Hydril multi-powered reverse drilling unit.

Hydril pressure equipment.

Representatives: Earl M. Daniels, sales manager; W. H. McNamara, assistant sales manager in Mid-Continent and Gulf Coast; J. P. Magoffin; and Allen S. Hicks.

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INDUSTRIAL ENGINEERING COMPANY
Los Angeles, California

Booth No. 11 Oklahoma Building

INDUSTRIAL ENGINEERING SERVICE
Tulsa, Oklahoma

Booth No. 48
Scientific and Technical Building

EXHIBIT: The following materials will be displayed:

(1) Ace-O-Pax packing and other allied items manufactured and distributed by Packing Engineering Company, Cranford, New Jersey. Ace-O-Pax is manufactured in numerous forms. It is a plastic pump packing manufactured to suit practically any industrial service. The characteristics claimed for it are long life, low friction load, and it is guaranteed not to score any rod, plunger, or shaft on which it is properly used, the makers state.

(2) Insurok and Ebrok products for the petroleum industry. These laminated Phenolic and Urea plastics are manufactured by the Richardson Company, Melrose Park, Illinois. The Richardson Company manufactures hundreds of articles in the commercial or industrial lines and also all sorts of materials and articles in the field of decorative plastics. The Industrial Engineering Service, however, confines its efforts to the manufacture and sale of items used by the petroleum industry, such as pump rings, compressor rings, pump plungers, pipe, tubing, bearings, etc. The types, grades, and special uses of these materials are numerous. They are not affected by any corrosive agents normally found in the producing or refining industries, it is claimed.

(3) Sarco steam specialties, manufactured by the Sarco Company of Bethlehem, Pennsylvania. This line of equipment includes temperature regulators, strainers, thermostatic and inverted bucket type steam traps, pipe savers, and numerous items incidental and accessory to these main articles.

Representatives: Industrial Engineering Service: L. D. Wyant, Craig Kennedy, and J. J. Powell. Sarco Company: Mr. Stewart, New York City.

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INDUSTRIAL SALES AND ENGINEERING COMPANY
Houston, Texas

Booth No. 67 California Building

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INGERSOLL-RAND COMPANY
New York, New York

Block J (outside)

EXHIBIT: Will display a 225-b.hp. No. 6-XVG, 3-stage, direct-connected, V-arrangement, gas-engine-driven compressor.

A 285-b.hp. No. 6-PVG6, V-arrangement, vertical, multi, four-stroke cycle, heavy-duty natural gas engine.

A 350-b.hp., Type S, heavy-duty, vertical multi-cylinder, four-stroke cycle, Diesel engine with a Farrel-Birmingham speed increaser gear connecting it with a Cameron No. 6-RT-4 centrifugal oil pipe-line pump.

Representatives: J. Janzen, New York; A. W. Loomis, Phillipsburg, New Jersey; F. W. Sultan, jr., manager, Houston, Texas, office; W. H. Lee, manager, Dallas, Texas, office; F. J. Wetzel, manager, Tulsa, Oklahoma, office; W. F. Dalton, Houston; D. T. Whiting, Longview, Texas; J. E. English, Longview; G. Brayden, Dallas; R. Henry, Midland, Texas; K. P. Hurley, Dallas; W. Leutwyler, Dallas; and W. M. Gebo, Tulsa.

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THE INTERNATIONAL DERRICK AND EQUIPMENT COMPANY
Columbus, Ohio

Block 3 (outside)

EXHIBIT: Will display a number of geared pumping machines, as well as a working model of the company's new cut-out switch. This switch is designed to shut down the prime mover of a pumping rig if the sucker rods, the beam hanger, a

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

Seismograph Service Corporation

TULSA, OKLAHOMA

WORLD WIDE EXPERIENCE

While at the **International Petroleum Exposition** — *Tulsa, May 14-21*

WE INVITE YOU TO VISIT US

at BOOTH NO. 10

Scientific and Technical Building

You are cordially invited to visit our offices in the Kennedy Building and to inspect our Laboratories at 620 East Fourth Street, Tulsa.

Displaying . . .

PORTABLE SEISMIC REFLECTION SURVEY EQUIPMENT
PORTABLE HARD ROCK ROTARY DRILL
HAYWARD AUTOMATIC MUD SAMPLER
RADIO PIPE LINE FINDER
and other Special Equipment

A field demonstration of the Seismograph is planned.

MANUFACTURING AFFILIATE

ENGINEERING LABORATORIES, INC.

KENNEDY BUILDING

TULSA, OKLAHOMA, U.S.A.

wrist pin, pitman, or any other part of the machine should break.

The Ideco Mechanical Rotary Drilling Rig, which will be displayed, is a much improved type of drilling rig, the manufacturers state. It is a compact, easily portable unit that will stand up under severe service with a minimum of maintenance expense, it is stated.

The rig, which consists principally of a Little Giant drawworks, Ideco two-speed reverse clutch, and the drawworks and slush pump power units, is conservatively designed for drilling operations to 6000 or 7000 feet. The unit features centralized control from the driller's position, and instantaneous reversing action. Six speeds forward and one reverse selection are available.

The Little Giant drawworks incorporates the same notable features as the Big Giant, which include pump-driven enclosed "pressure-spray" chain oiling system, machine-cut sprockets throughout, compound equalized brakes with micro-sensitive feed-off characteristics and centralized lubrication, water-cooled brake rims, and self-aligning roller bearings on line and drum shafts.

The two-speed reverse clutch was designed to incorporate the adaptable features of the Giant drawworks, which include the chain drive operating on machine-cut teeth and lubricated by the pump-driven "pressure-spray" chain oiling system, and self-aligning bearings on the power input and take-off shafts.

The clutch not only serves as a reversing mechanism, but provides a selection of two forward speeds to the drawworks. The selective speed clutch and the friction clutches are controlled from the driller's position, the forward and reverse friction clutches being operated by air-remote control.

Each power unit consists of a welded steel skid assembly upon which is mounted a 200-hp. drilling engine and a shaft mounted on two self-aligning roller bearing pillow blocks, which is connected to the engine crankshaft by a flexible coupling. The shaft supports a V-belt sheave mounted on roller bearings and connected to a friction clutch, and a V-belt sheave keyed to the shaft. The two friction clutches on the power units are also controlled by air from the driller's position.

The drive from the power units to the pump and reverse clutch are multiple V-belt drives. The drive from the reverse clutch to the drawworks is double strand roller chain with cut-tooth sprockets. The drive is enclosed in an oiltight housing and the chain lubricated by the drawworks chain oiling system.

Incidentally, the company has erected a new building on its lot this year.

Representatives: L. J. Brown, E. H. Eddleman, C. M. Powell, John Edwards, E. H. Jensen, Dan Fell, F. E. Suder, and C. R. Athy.

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INTERNATIONAL HARVESTER COMPANY

Chicago, Illinois

Block 101 (outside)

EXHIBIT: A new permanent building, together with adjoining lot, will be devoted to a greatly enlarged International Harvester exhibit. An all-steel structure with concrete floor, 50 ft. by 70 ft. in size, is being constructed on the new east-side section of the grounds. North of the building is a lot 40 ft. by 70 ft. in which heavier types of equipment, especially a variety of tractors and motor trucks rigged up for oil-field work, will be shown.

The north half of the building will be devoted to motor trucks. A feature of the motor truck display will be a large, specially-finished DR-346-F six-wheel International chassis and cab with rear end mounted on rollers to show flexibility of four-wheel drive at rear. A D-2 International station wagon, a ¾ to 1-ton Model D-15 of 125-in. wheelbase, a 1½ to 2-ton Model DS-35 with two-speed rear axle and of 161-in. wheelbase, and a 3 to 4-ton Model D-50 of 161-in. wheelbase, the three latter named to be equipped with oil-field equipment, several motor truck engines, and a special motor truck parts display will also be included in the indoor motor truck exhibit.

The other half of the interior exhibit includes several sizes of International power units (one a Model P-50 having butane equipment) used in drilling, pulling rods, and various oil-field operations, a T-20 crawler TracTracTor equipped with winch, a T-40 crawler TracTracTor equipped with bullgrader and winch, a cutaway Diesel engine, a magneto display, a sprocket and roller display, a display showing how surface hardening is accomplished by the famous Tocco process, and two miniature derrick displays.

About one-half of the outside space will also be devoted to motor trucks equipped for heavy-duty oil-field work. Two of these will be big six-wheel Internationals, one a Model D-246-F of 215-in. wheelbase and the other a Model DR-426-F of 233-in. wheelbase. A third International will be a 3½ to 4½-ton Model DR-60 with double-reduction herringbone gear drive and the fourth a Model D-300 cab-over-engine International.

The southern part of the outdoor exhibit consists of two wheel-type International tractors, a Model W-40 and a Model I-30 equipped with front-end winches; two crawler tractors, a T-40 TracTracTor and a T-35 TracTracTor equipped with pipe booms; and two power units, one a Model U-7 mounted on trailer to make of it a portable unit and a P-300 connected to pump. A big derrick outside will serve as a tower for floodlighting.

Among the tractors to be shown is the recently-developed T-35 TracTracTor that is powered by a 6-cylinder engine. This new crawler tractor has variable-speed governor, 5-speed transmission with forward speeds of 1¾ to 4 miles an hour and 2¼ reverse, ball bearings at 43 points, replaceable cylinders, Tocco electrically-hardened crankshafts, special dust seals, fuel strainers, air cleaner, oil filter, and unit construction throughout that permits removal of important working parts as units and thus makes adjustments and replacements possible in minimum time. Other data of interest are as follows: Track face (regular shoe), 13 in.; track tread, standard-tread model, 45 in.; wide-tread model, 56 in.; track ground contact, 64⅜ in.; total length, 132⅛ in.; and total width (standard-tread model) 59¼ inches. Bore and stroke are 3⅝ in. by 4½ inches.

The "D" line of motor trucks ranges in capacity from half-ton light-delivery or pick-up units to the largest six-wheelers. They include conventional four-wheel units, six-wheelers with both dual-drive and trailing axles, and cab-over-engine types. The complete International line consists of 24 models in 73 wheelbases with gross vehicle weights ranging from 4,400 to 62,000 pounds.

Representatives: The exhibit will be in the direct charge of R. W. Elliott, manager, Tulsa, Oklahoma, branch. He will be assisted by motor truck and industrial equipment salesmen from ten neighboring branches who will be present on staggered schedules. Various branch managers and quite a number of sales executives from the main Chicago office are also planning to attend.

THE INTERNATIONAL NICKEL COMPANY, INC.

New York, New York

Booths Nos. 64, 65, and 66 **Texas Building**

EXHIBIT: Display will feature nickel-alloy steel sucker rods, Monel pump rods, nickel-steel tool joints, and other similar specimens. A feature of the exhibit will be the background of the booth on which will appear an animated flow chart showing the many applications of nickel-containing alloys in both the production and refining of petroleum products.

Representatives: O. B. J. Fraser, B. B. Morton, A. G. Zima, J. S. Welwood, F. R. Bailey, and G. W. Strahan.

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INTERNATIONAL SUPPLY COMPANY

Tulsa, Oklahoma

Block 103 (outside)

EXHIBIT: The improved Isco Pumping Units will be shown and the 17,000 double-crank and 8000 D.C. beam type units will be featured. These pumping units are designed for maximum oil field service with ample provision for sudden torque and high load capacity. Equipped with Foote Bros. IXL helical gears

The Isco rotary rig reverse clutch operation is described by drillers as being "more like steam" than any other reverse clutch they ever used, the manufacturers state. Heavy structural steel base, welded construction extending beyond V-belt sheave permits handling from either end; roller bearings for all shafts.

Isco streamlined rotary traveling blocks with sheave and center pin constructed similar to rotary crown block. Available in either four or five sheave blocks.

Isco kellys are forged from a single piece and bored true. Top and bottom connections are intregal with the square section; all formed during a single forging operation.

Isco crown blocks for rotary drilling are available in 150-ton and 300-ton capacities.

Isco drill collars are made from either straight carbon or alloy steels with proper heat treatment.

For handling long strings of pipe safely and economically, the Isco safety casing spider is offered. Accommodates slips from 10¾-in. O.D. to 4¾-in. O.D.

Sargent Engineering Corporation pumps, and Titusville Iron Works Company products will be shown also.

Representatives: A. E. Ballin, A. F. Bourne, Bob Bradshaw, W. A. Chaney, R. L. Cobb, Wm. Conrade, W. B. Cotton, W. T. Davis, R. E. Dow, A. B. Harrison, J. C. Mann, R. L. Neal, R. W. Neal, L. J. Nelson, H. M. Quick, T. B. Simpson, John W. Sloan, R. W. Trimble, M. Q. Wilson, J. B. Wrigley, and E. H. Butler.

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IVERSON TOOL COMPANY

Tulsa, Oklahoma

Booths Nos. 14, 15, and 16 **California Building**

EXHIBIT: The Young drilling engine unit for cable-tool and rotary drilling, lighting outfits, and power units. The new Barney rotary hose couplings also will be shown along with other rubber hose.

Representatives: S. J. Iverson, Ft. Worth, Texas; S. B. Iverson, Midland, Texas; A. M. Iverson, Okmulgee, Oklahoma, and C. C. Hurlburt, and Lou Weedy of Tulsa, Oklahoma.

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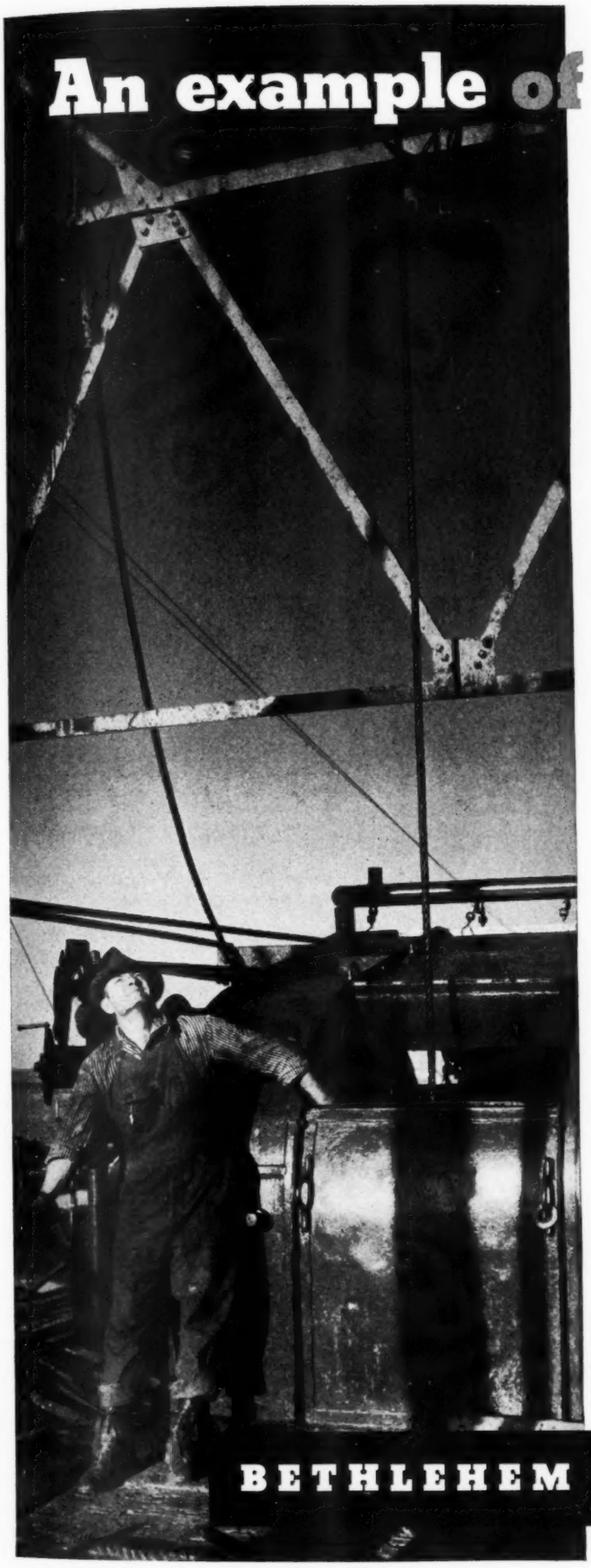
JACOBS WIND ELECTRIC COMPANY, INC.

Minneapolis, Minnesota

Booth No. 70 **Kansas Building**

EXHIBIT: A wind-driven generating unit for cathodic protection of pipe lines mounted on a short tower will be displayed in the booth. In addition to this complete unit, the

THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending Exposition. Register immediately on arrival.



An example of Bethlehem's *know how*

Uni-Zact core in rotary lines

YOU have seen rotary lines go to pieces at the crossover, as a result of crushing of the strands and ultimate breaking of the individual outside wires. Here is the reason: Regardless of strength and quality of steel, life is often limited by the manner in which the core supports the strands.

The introduction of the Uni-Zact core has to a great extent removed this cause of rope failure. The Uni-Zact core, an exclusive Bethlehem feature, is composed of manufactured parchment strips instead of hemp. Impregnated and twisted into a firm, smooth base, this core gives a more solid, more uniform foundation for the rope than can be obtained from non-uniform, grown fibers. Further, the Uni-Zact core, being made of a tougher waterproof, rotproof material—with flat surface bearing on flat surface—does not wear or disintegrate from flexing and running of the line as do sharp-edged natural fibers.

Bethlehem's "know how," the result of half a century of experience in wire rope manufacture, brings you this improvement. It also brings you other improvements that lengthen rope life. For example, the core in this rope, as contrasted to Cable Drilling Lines, is oversize—meaning additional support to strands. Strands, core, and the entire rope are thoroughly lubricated. And when Form-Set, Bethlehem preformed line, is used, another cause of shortened life is overcome because outside wires, when broken, lie flat and in place. They do not bend back and cut into the strands.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

individual parts will be displayed, showing the general construction.

Representatives: M. L. Jacobs, secretary-treasurer of the Jacobs Wind Electric Company; and Pat Lewis of Lewis Brothers Company, Tulsa, distributors.

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JARECKI MANUFACTURING COMPANY

Erie, Pennsylvania, and St. Louis, Missouri

Booths Nos. 78 and 79 Texas Building

EXHIBIT: Equipment on display will consist of Jarecki valves and fittings, casing-heads, pumping tees, stuffing boxes, rod-line carriers, and hinged bell nipples.

Representatives: R. W. Hill, engineer, Tulsa, Oklahoma; and others.

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THE JEFFREY MANUFACTURING COMPANY

Columbus, Ohio

Booths Nos. 88 and 89 Kansas Building

EXHIBIT: Equipment on display will consist of the Jeffrey Blue Streak shale-shaker, several samples of oil-well drilling chains, an electric vibrating screen, and electric vibrating feeders.

Representatives: T. P. Burke, district manager, Dallas, Texas; L. E. Brill, products sales manager, Columbus, Ohio; A. T. Cecil, Jeffrey Traylor Division, Columbus; and H. F. Adrian, field engineer.

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JENKINS BROTHERS

New York, New York

Booths Nos. 13 and 14 Kansas Building

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JENSEN BROS. MANUFACTURING COMPANY

Coffeyville, Kansas

Block 1 (outside)
Block 5 (outside)

EXHIBIT: Will exhibit in the Bridgeport Machine Company's building and outside space and in the Frick-Reid Supply Corporation's outside space.

One of the smallest and latest models, the No. 2C, will be in operation inside the Bridgeport building and one of the company's largest models, the 22C, will be in operation in Bridgeport's outside space. The display in connection with the Frick-Reid Supply Corporation will consist of four No. 4C units and one No. 14C unit in operation in Frick-Reid's outside space.

Representatives: Following district representatives: W. G. Hellinghausen, Breckenridge, Texas; L. G. Fenn, Houston, Texas; C. R. Stahl, Tyler, Texas; J. W. Tinsley, Wichita, Kansas; Floyd Gerdes, Salem, Illinois, and possibly A. V. Turner, Huntington Park, California. W. G. and K. R. Jensen will be present at various times, of course.

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JOHNS-MANVILLE

New York, New York

Booths Nos. 44, 45, 46, and 47 Oklahoma Building

EXHIBIT: The new Johns-Manville one-piece asbestos suit will be featured together with a number of other products that serve the oil industry in many ways. These include transite asbestos-cement pipe for salt water disposal lines; insulations and refractories; brake linings; packings, and materials for the protection of underground pipe lines. Other products in the J-M display will be Celite filter-aids, used in the clarification of lubricating oils; and corrugated and flat transite asbestos sheets for industrial roofing and siding, and for furnace casings.

Representatives: J. S. Carroll, vice-president, Johns-Manville Sales Corporation; J. A. O'Brien, assistant general sales manager of Power Products and Industrial Department at Johns-Manville; F. W. Hodson, Johns-Manville, Houston, Texas, office; T. C. Greenwood, Johns-Manville, St. Louis, Missouri, office; M. E. Duncan, Johns-Manville, Tulsa, Oklahoma, office; and E. J. Liggett, Johns-Manville, Tulsa, Oklahoma, office.

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THE JOHNSTON AND JENNINGS COMPANY, INC.

Oceco Division
Cleveland, Ohio

Booths Nos. 82 and 129 Oklahoma Building

EXHIBIT: Complete line of tank equipment, including breather valves, flame arrestors, swing line equipment, automatic tank gauges, equipment for spheriod tanks; also still safety valves, look boxes, etc., for refineries will be displayed.

Representatives: H. H. Fleming, vice-president, Wm. H. McGuangle, from the factory; also John M. McGregor and Fred Thilenius, Tulsa representatives.

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M. O. JOHNSTON OIL FIELD SERVICE CORPORATION

Los Angeles, California

Booths Nos. 81 and 82 Kansas Building

EXHIBIT: Products to be exhibited:

Latest type equipment for the testing of oil and gas wells (Formation Tester).

A working model of the Formation Tester will be operated in a glass model of an oil well at half-hour intervals throughout the duration of the show.

Tyler swabs.

Portable tool-joint facing equipment.

Bottom-hole pressure recorders.

Representatives: M. O. Johnston, Blaine Johnston, sr., F. E. O'Neill, W. F. Bettis, R. G. Whealton, and B. W. Davidson.

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JONES AND LAUGHLIN STEEL CORPORATION

Pittsburgh, Pennsylvania

Booths Nos. 12, 13, 14, 15, and 16 Oklahoma Building

EXHIBIT: The outstanding features of the display will be the new and improved J & L Integral Joint Blue Ribbon seamless drill pipe, and actual demonstrations of the thread inspection routine practiced in the J & L tubular mills. These features will be displayed and conducted against a colorful background. Included, also in the exhibit will be comprehensive displays of the full line of J & L tubular products for the oil industry, a map showing the location of oil field stores where J & L tubular products are available, and samples of oil drums and containers formed of J & L strip and sheet products and J & L coke tin plate.

The J & L tubular products for the oil industry include J & L Integral Joint Blue Ribbon seamless drill pipe, a specialty, developed and manufactured exclusively by Jones and Laughlin, and J & L seamless drill pipe, J & L seamless drive pipe, J & L seamless casing, J & L standard tubing, plain and external upset, J & L seamless line pipe, J & L seamless boiler tubes, and J & L seamless and welded standard pipe.

The J & L mill thread inspection routine should be of particular interest to all oil men. Inspectors using the most advanced precision instruments will give a practical demonstration by checking threads on both pipe and couplings for correctness of pitch, depth, taper, size, and thread contour, explaining each step in the routine as it is performed. Capable and well qualified J & L tubular mill inspection personnel will be available to answer questions that guests may care to ask.

Representatives: H. E. Lewis, president; L. M. Parsons, vice-president and general manager of sales; W. H. Wiewel, assistant general manager of sales; John O'H Anderson, manager of sales, tubular products; H. L. Miller, assistant manager of sales, tubular products; C. E. Swindler, district sales manager, Tulsa, Oklahoma; H. W. Graham, general metallurgist; A. P. Holloway, tubular sales department; A. H. Quay, metallurgical engineer, tubular products; H. L. Summers, chief inspector, tube mills; A. E. Crockett, manager, bureau of instruction; W. R. K. Scott, field engineer, Houston, Texas; and W. C. Jamieson, field engineer, Houston.

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THE S. M. JONES COMPANY

Tulsa, Oklahoma

Booths Nos. 18 and 19 Oklahoma Building

EXHIBIT: All Jones products, including sucker rods, pull rods, pony rods, and polished rods and the Kemler Well Weigher will be displayed.

Representatives: Booth will be in charge of Holt McWorkman, manager of the Oklahoma Division. Also in attendance will be P. C. Jones, president; H. K. Browning, sales manager; L. J. Pundt, Southern Division Manager; and J. W. Lowes, district representative.

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THE JOYCE-CRIDLAND COMPANY

Dayton, Ohio

Booths Nos. 49 and 50 Texas Building

EXHIBIT: Will exhibit the company's complete line of lifting jacks, both mechanical and hydraulic, especially the types adaptable for oil-field service. The following Joyce jacks for oil-field service will be featured: (1) Joyce 20-ton and Joyce 50-ton jacks for skidding derricks and general oil field service; (2) Joyce emergency jack of 15 tons capacity for oil companies, drilling contractors, and trucking contractors; (3) Joyce Liftmaster hydraulic jacks, from 1½ to 30 tons capacity, for oil companies, trucking contractors, drilling contractors, and spudder contractors; and (4) Joyce journal jacks and self-lowering jacks for refinery car shops and general oil field service.

Representatives: Huston Brown, vice-president, and Harry B. Burlow, district manager, in charge of oil country sales.

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KARGL AERIAL SURVEYS, LTD.

San Antonio, Texas

Booth No. 73 Scientific and Technical Building

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KEASBEY AND MATTISON COMPANY

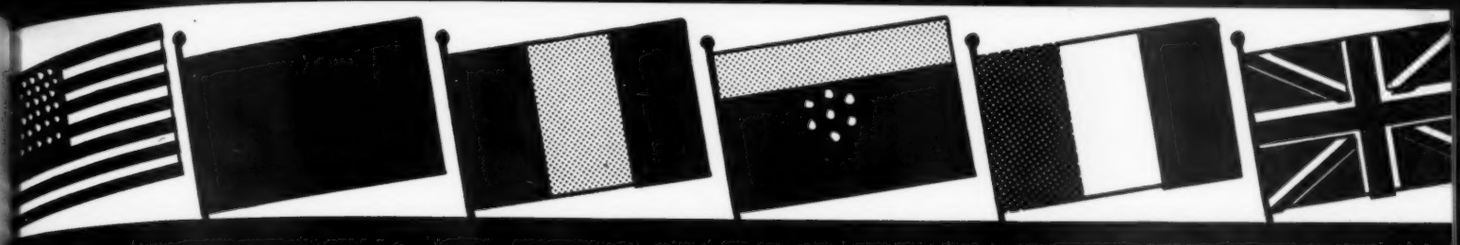
Ambler, Pennsylvania

Booths Nos. 35 and 36 Refiners and Marketers Building

EXHIBIT: Products featured in the display will include packings of various types, asbestos-magnesia insulations for oil refinery needs, and asbestos corrugated sheathing. The display will consist mainly of photographs of oil refinery installations of various types of asbestos magnesia insulations. The insulation featured to the greatest extent will be the Hy-Temp Combination that is said to be efficient as an insulation up to 1900 deg. fahrenheit. Hy-Temp Combination consists of an inner core of Hy-Temp and an outer core of "Featherweight" 85 percent Magnesia. The inner core of Hy-Temp serves to protect the outer core of "Featherweight" 85 percent Magnesia from excessive temperatures as "Featherweight" 85 percent Magnesia itself will not withstand temperatures above 600 deg. fahrenheit. Hy-Temp Combination is available in pipe and block form.

The "Featherweight" 85 percent Magnesia also will be featured, particularly in block form for the insulation of stills.

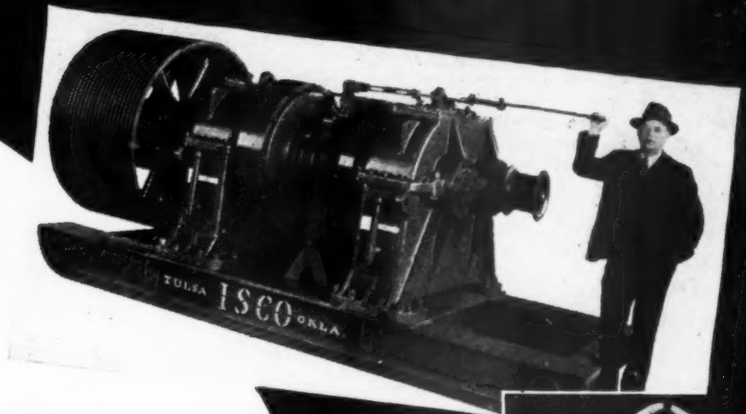
Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.



INTERNATIONAL EXHIBIT

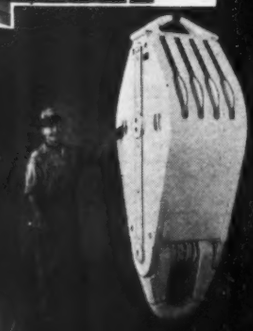
ISCO Pumping Units,
8000 and 17000 lb. Units
on Display

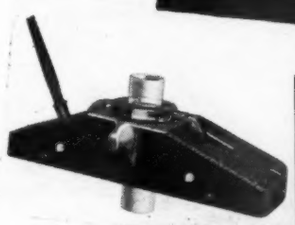
**See This ISCO Equipment,
Block 103, Skelly Drive**

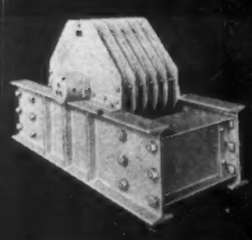


RC1 ISCO
Reverse Clutch

ISCO
Streamlined
Rotary
Traveling
Block







ISCO
Casing Spider

ISCO Crown Block

**And Other ISCO Drilling And
Production Equipment**

At the International Petroleum Exposition, you will see in our exhibit, the very latest ISCO equipment for a great industry, and understand why ISCO products are superior.

But we will see our exhibit as a new triumph. For we will remember 30 years ago when we first begin applying engineering principles to the equipment for an infant called Production.

Through the years since 1908, International Supply—Oklahoma Iron Works, two pioneer institutions, have faithfully endeavored to justify the wide confidence and patronage they have enjoyed.

"NEXT TIME CALL INTERNATIONAL"

OKLAHOMA
Tulsa — Oklahoma City
Seminole — Wewoka
Maud — Fittstown

NEW MEXICO
Artesia — Hobbs

KANSAS
Chase — Great Bend
Hays — Hutchinson
*Wichita

TEXAS
Kilgore — Kermit
Turnertown — Willow Springs
Odessa — Pampa
Wink — Houston
*Dallas — Kemp City

*Offices Only

INTERNATIONAL SUPPLY CO.

▶▶▶ TULSA, OKLAHOMA ◀◀◀

KEROTEST MANUFACTURING COMPANY
Pittsburgh, Pennsylvania
Booths Nos. 89, 90, 121, and 122
Oklahoma Building

EXHIBIT: On display will be complete working systems of well control including all operations from the drilling-in to putting the well on production and embodying Gray-Kerotest lines of casingheads, tubingheads, and casing hangers, Kerotest valves and fittings in all types and sizes, carrying the latest designs and improvements, together with many oil-field specialties designed for high-pressure oil-field service. Safety, economy, and flexibility will be featured on all these systems and products.

Representatives: Edward G. Mueller, Walter G. Swaney, Harry C. Potts, Shep F. Miers, J. D. Isaacks, C. C. Trees, Clyde L. Alexander, and Joseph A. Swaton.

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KEUFFEL AND ESSER COMPANY
Hoboken, New Jersey
Booth No. 55
Scientific and Technical Building

EXHIBIT: The exhibit will be devoted to Wyteface steel tapes. Wyteface is a steel tape having black-on-white graduations, easy to read even in dim light, and with a crack-proof surface that protects the steel from rust and corrosion. A full line of Wyteface tapes, in cases and on reels, for every oil-field requirement will be shown.

Representatives: W. F. Birkicht and H. E. Bowman, St. Louis, Missouri.

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KEY COMPANY
East St. Louis, Illinois
Booths Nos. 65 and 66
Refiners and Marketers Building

EXHIBIT: Products to be displayed will be the company's general line of return bend fittings for tubestills.

Representatives: Dr. Fred Key, M. B. Crowe, Max Masel, E. H. Mollman, and G. A. Miller.

●

WALTER KIDDE AND COMPANY, INC.
New York, New York
Booth No. 87 **Texas Building**

EXHIBIT: Display will be of Lux carbon dioxide fire-extinguishing equipment and Kiddefoam generating equipment. The Lux carbon dioxide equipment is recommended as first aid equipment for the protection of flammable liquid and electrical hazards found in refineries, bulk stations, the production field, and service stations. The Kiddefoam generating equipment is recommended for the protection of large storage tanks or for the extinguishment of large flammable liquid fires too large for the use of the smaller first aid equipment.

Representatives: C. Strain, assistant sales manager, Walter Kidde and Company; W. L. Walker and W. S. Walker, of W. L. Walker Company; and S. G. Freck, of Walter Kidde and Company.

●

KOPPERS COMPANY
Baltimore, Maryland
Booths Nos. 74 and 75 **Texas Building**

EXHIBIT: Will display all types of piston rings for oil field equipment, including rings for high-speed Diesels, hot-oil pumps, gasoline pumps, etc. Fast's Flexible Couplings made by the Bartlett Hayward Division also will be exhibited.

Representatives: John A. Worthington, manager, Industrial Sales and Engineering, Baltimore; E. S. Freeman, jr., and Bart Aldridge of Baltimore; Harry Nolan and M. S. Kelly of Tulsa, Oklahoma; J. M. Fuller, Fort Worth, Texas; and M. T. Maguire of the Bartlett Hayward Division.

LANDIS MACHINE COMPANY, INC.
Waynesboro, Pennsylvania
Booths Nos. 6, 7, and 8 **Oklahoma Building**

EXHIBIT: Will have in actual operation a 13⅜-in. Landis receding chaser pipe threading and cutting-off machine and a 2½-in. Landmaco threading machine. The 13⅜-in. Landis pipe threading and cutting-off machine provides a machine for the cutting of threads on casing, tubing, and drill pipe. The 13⅜-in. Landis receding chaser pipe machine covers a wide diametrical range of sizes from 4½ in. to 13⅜ in., inclusive, and only two sets of chasers are required to cover this entire range, so long as the pitch, thread form, and taper remain the same. This feature eliminates the necessity for the frequent changing of chasers. The taper on the 13⅜-in. Landis pipe machine is controlled and produced through a sine bar that is adjustable and gradually recedes the chasers as the head is propelled forward by means of a lead screw.

The Landmaco threading machine is a precision-built tool designed primarily for the threading of bolts, rods, etc., on a high production basis. A few of the features of this machine are: hardened and burnished chrome-nickel steel gears, anti-friction bearings for all shafts, spiral-bevel gear drive, die-head spindle mounted on pre-loaded anti-friction bearings, telescoping steel guards for the carriage ways, combination steel and felt wipers for the ways, and both horizontal and vertical adjustments for the carriage fronts.

Representatives: C. N. Kirkpatrick, secretary and sales manager; G. M. Stickell, assistant sales manager; R. G. Mumma, manager of the Tap Division; J. R. Funk, Texas representative; and R. L. Moore, California representative.

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LANE-WELLS COMPANY
Los Angeles, California
Block V (outside)

EXHIBIT: One of the most colorful and comprehensive exhibits in the history of oil shows is the aim of the Lane-Wells Company in their plans for the Exposition. The building housing the exhibit will be of modern design, and it will have a large gun-perforator extending from the roof, surmounted by an American flag. At 10-ft. intervals around the building will be flags of some of the other countries served by the Lane-Wells Company.

The latest type gun-perforator truck will be shown, manned by a regular field crew. Truck operations, including controls, weight recorders, and depth measurements, will be demonstrated without the actual firing of the gun. An assortment of gun sizes, cut-away models, chambers, loads, samples of perforations, and animated movies of the complete story of perforating will be shown.

A complete line of packers and liner hangers also will be shown, along with the latest developments in bridging plugs.

Well-surveying and directional-drilling services will be demonstrated, showing a complete line of the various types of surveying instruments and cut-away models. There will also be animated moving pictures of oriented surveys, single-shot survey instruments, and directional control of drilling wells, including Lane-Wells knuckle joints.

This inside exhibit also will include the engineering phases of gun-perforation, design, and application, and other research investigations being conducted in the Lane-Wells engineering laboratories.

LARKIN PACKER COMPANY
St. Louis, Missouri
Booths Nos. 111 and 112
Oklahoma Building

EXHIBIT: Will display floating and guiding equipment of all kinds to illustrate the various methods used to float in casing in fields throughout the country. Also on display will be the company's new Formation Pack Shoe and Uniflow Guide Shoe. A complete line of swage nipples and bull plugs will be shown, as well as casing supports that include spiders, casingheads and tubingheads, and casing and anchor clamps. The tubinghead has just been placed on the market and the makers state it is something new in the way of a stripper rubber head that allows running tubing under pressure.

Representatives: H. S. Lindenmuth, I. P. Allen, W. G. Baumann, C. F. Dougherty, Milt Greve, J. J. Larkin, Sr., J. J. Larkin, jr., and W. H. Larkin.

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LEBANON STEEL FOUNDRY
Lebanon, Pennsylvania
Booths Nos. 79 and 80 **Kansas Building**

EXHIBIT: Display will consist of steel castings of the type manufactured by the company for the oil, as well as other, industries, made of carbon, high-strength alloy, and stainless casting steels.

Representatives: A. J. McDonald, vice-president in charge of sales; Fred Grotts, vice-president and metallurgical director; Charles H. Folwell, Jr., Texas representative; and P. E. Gerhard, sales engineer.

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LEEDS AND NORTHRUP COMPANY
Philadelphia, Pennsylvania
Booths Nos. 29 and 30
Scientific and Technical Building

EXHIBIT: The following equipment will be displayed:

Micromax Pneumatic Control. This control, which holds tower temperature to a selected control point with the steadiness essential to full efficiency, will be in operation.

Micromax Rayotube Control. The temperature of filtering clay passing through a revivifying furnace can now be detected as it moves, continuously indicated, recorded, and automatically controlled. Rayotube, the detector that makes this possible, is situated safely outside the furnace; it merely "looks" through a hole directly at the clay being plowed across the hearth. This equipment will be shown as though in operation on a revivifying furnace.

L&N Universal pH Indicator. This new portable pH potentiometer reads directly in pH with glass, quinhydrone, or hydrogen electrode. It is designed for high accuracy and maximum operating convenience. The instrument is equipped with electrodes and chemical supplies that are contained in the case.

Micromax Temperature Recorder. A representative instrument will be shown in actual operation. Uses a strip chart on which from one to sixteen temperatures can be recorded legibly and read easily.

L&N Cabinet-mounted Indicator. Display model will show how effectively this instrument enables an operator to measure temperatures of near or distant couples with equal reliability. Through switches, the indicator may be connected instantly to any of a large number of couples.

L&N Portable Indicator. This indicator is useful among plant instruments for temperatures taken at the operator's discretion. It is used to supplement recorders and controllers, replace them while they are serviced, make many kinds of tests for a variety of intermittent temperature measurements.

Representative: M. E. Griffith.

Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

For the Want of a Nail

Whether it be in

BATTLE

"For the want of a nail,
the shoe was lost
For the want of a shoe,
the horse was lost
For the want of a horse,
the rider was lost
For the want of a rider,
the battle was lost
From the loss of the battle,
the kingdom was lost—
All for the want of a
two-penny nail."

OR

INDUSTRY

For the want of protection provided by a common wire nail in the Abercrombie SHEAR-RELIEF Valve the parade of costly oil field pumps to an early retirement continues. By the same token, the loss from blown up pump parts grows on . . . all for the want of a nail.

FLUID-PISTON SLUSH PUMPS
ABERCROMBIE PUMP CO.
GULF BLDG. HOUSTON TEX.

SHEAR-RELIEF VALVE

LELAND EQUIPMENT COMPANY
Tulsa, Oklahoma

Block C (outside)

EXHIBIT: Chicago pneumatic air compressors and other air equipment, Leeco pole trailers; Insley back hoe; Koehring crawler-type crane; Koehring mixer; Gorman-Rupp pumps; electric air hose; Latham brakes, and numerous other items will be displayed.

Representatives: H. R. Leland, H. R. Downs, Ralph L. Thomson, Frank Squires, G. T. Haman, Tom Robertson, J. C. Gorman, Ray Dorward, and D. G. Reeder.

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LE ROI COMPANY
Milwaukee, Wisconsin

Block R (outside)

EXHIBIT: The equipment to be shown will consist of a 12-cylinder, 350-hp. drilling engine, a 6-cylinder, 175-hp. drilling engine completely equipped with all accessories required for a unit of this type. Several sizes of pumping engines are to be shown; a complete 15-kw. engine-generator set; two small light plants for oil-field service, and the Le Roi-Rix Air Master.

Representatives: C. W. Pendock, president; J. R. Frantz, vice-president; A. F. Sheller, secretary; W. R. Karll, sales manager; P. W. Eells, assistant to president; Allen Bartlett, chief engineer; Harry Hummer, service department; L. G. Valdes, branch manager; D. W. Mortonson, assistant branch manager; and R. A. Pride, service department.

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A. LESCHEN & SONS ROPE COMPANY
St. Louis, Missouri

Booths Nos. 116 and 117 Texas Building

EXHIBIT: Display will consist of samples of the various kinds of wire rope used in the numerous divisions of the oil industry, chief among which will be the "Hercules" (Red-Strand) rotary lines, which are supplied both in round strand and flattened strand constructions, and in either standard or preformed types.

Representatives: W. C. Henning, secretary and treasurer; L. E. Dressler, W. G. Jordan, L. W. Weyler, E. E. Lambert, and J. C. Hoffman.

•

LEWIS BROTHERS COMPANY
Tulsa, Oklahoma

Booth No. 70 Kansas Building

EXHIBIT: Will show the Jacobs Cathodic Wind Electric Generator for pipe-line protection. All other lines handled by the company will be shown by the manufacturers, as follows: International Harvester Company, Muskogee Iron Works, Bucyrus Erie Company, and The Trackson Company.

Representatives: Pat S. Lewis and M. L. Jacobs.

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THE LINCOLN ELECTRIC COMPANY
Cleveland, Ohio

Booths Nos. 201, 202, 249, and 250 Oklahoma Building

EXHIBIT: The new Diesel engine arc-welding machine, recently announced, will be the feature of the exhibit. The new welder compares favorably with gasoline-engine-driven arc-welders in price, weight, and operating speeds, its makers state. The new welder brings the economies of Diesel operation to construction of pipe lines and other applications requiring engine-driven arc-welders, it is stated. The machine is said to reduce fuel costs as much as 70 percent.

The Lincoln exhibit of arc-welding equipment also will include latest models of stationary and portable motor-driven "Shield Arc S. A. E." arc-welders that introduced dual continuous control last year. The value of this method of arc-welding current control will be demonstrated together with the welding of various metals. The demonstrations will include welding with recently-developed electrodes: "Fleetweld 8" for high-speed, single-pass fillet welding, "Fleetweld 9" for fast production of butt welds in heavy plate, "Chromeweld 4-6" for four to six chrome steels, and "Transweld" for use with small transformer-type arc-welders. Other Lincoln electrodes will be included in the electrode display. Latest developments in arc-welding accessories and supplies, as well as "Linc-Weld" motors, also will be shown.

Representative: A. F. Davis, vice-president.

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LINDE AIR PRODUCTS COMPANY
New York, New York

See Union Carbide and Carbon Corporation exhibit.

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LINEAR PACKING AND RUBBER COMPANY, INC.
Tacony, Philadelphia, Pennsylvania

See Frick-Reid Supply Corporation Exhibit

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LINK-BELT COMPANY
Chicago, Illinois

Booths Nos. 61, 62, and 63 Texas Building

EXHIBIT: The display will include the latest design of Link-Belt vibrating screen for reconditioning rotary mud; an operating chain drive unit incorporating the various types of chains used on drilling rigs; and samples of Silverlink roller chain, the company's line of Hyper and Red-Hed rotary drilling chains, and other power transmission parts. Black-faced "Amos" will be the official greeter.

Representatives: Pete Wallace, Bob Horton, Houston, Texas; Bill Abele, Tulsa, Oklahoma; Red Penick, Odessa, Texas; F. S. O'Neil, C. R. Weiss, C. W. Spalding, Indianapolis, Indiana; G. M. Sharer, H. L. Strube, Philadelphia, Pennsylvania; and A. H. Boike, Chicago, Illinois.

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LUBRIKUP COMPANY, INC.
Williamsport, Pennsylvania

Booth No. 104 Kansas Building

EXHIBIT: The following equipment will be on display:

Valve cups: hard, medium, and soft. Developed by LubriKup Company to meet different depth well conditions.

Seat cups: developed by LubriKup Company for use on hold-downs for insert pumps. The only seat cup made especially for hold-downs, the manufacturers say.

Jerkerkups: a composition pump cup developed for "Jerker" pumps and later adapted to all makes and sizes of power pumps in pipe line and refinery service.

Stapakt repacks: pre-formed repack.

Resistoil rings: composition rings with controlled expansion due to action of fluids and temperatures.

Representatives: W. M. (Bill) Connor, Marvin L. Frazier, C. S. (Froggie) Vogel, and Wayne P. Wood.

•

LUCEY PRODUCTS CORPORATION
Tulsa, Oklahoma

Block R (outside)

EXHIBIT: Present plans call for the display of a Hudson-Boucher automatic shale separator and a Hayward automatic mud sampler.

The Hudson-Boucher Automatic Shale Separator is operated by gravity flow of the drilling fluid against turbine blades, the machine requires no other motive power. The Hudson-Boucher machine effects complete separation by the rotation of the screen unit as the fluid passes through. Clean mud passes through the screen, down into the return trough, while cuttings are discharged out the open end of the screen cylinder.

Dissatisfaction with the methods of sampling the mud at wells being drilled with rotary drilling equipment both for its drilling properties and for the geological information to be obtained from cuttings led to the development of the Hayward Automatic Mud Sampler, the manufacturers state. This machine is placed in the mud ditch in such a manner that the flow of the drilling mud against its paddle wheel causes it to pick up continuous samples of the mud itself by means of spoons attached to the blades of the wheel. These spoons are arranged so as to deposit mud only in the first of two containers and mud and cuttings in the second, which is a nest of screens continuously washed with a stream of clear water. In this manner continuous and proportional sampling of the drilling mud and cuttings is accomplished automatically.

In conjunction with the exhibit The Wheland Company, manufacturers of the Wheland line of rotary drilling equipment, plan to show the following units:

A B-3200-A Wheland heavy drawworks with 8-in. drumshaft and 7-in. lineshaft, with four speeds on the drum and two rotary-drive speeds. Water-cooled flanges and individual chain guards.

A B-7000 380-hp. at 400 r. p. m. Wheland reverse clutch.

A J-6600 Wheland 6-sheave heavy-duty six-in-line crown block.

A K-7050-B Wheland 80-in. 5-sheave streamline traveling block.

An E-6500-B 6-in. Wheland quadruple bearing oil bath swivel.

An A-18000 Wheland 27½-in. portable oil bath, fully-enclosed, all-steel rotary.

An H-20000 Wheland 15½-in. by 8-in. by 20-in. duplex steam slush pump with self-draining steam end.

An HP-11000 Wheland 7¼-in. by 14-in. power pump.

It is quite likely that the HP-11000 power pump will be driven by a Le Roi Model RXIV, 8-cylinder, 6¾-in. by 7-in. drilling engine.

Representatives: R. S. Levering, sales manager; Oliver H. Attridge, chief engineer; J. N. Dwight, field salesman; and A. C. Willingham, sales manager of The Wheland Company, will be at the exhibit most of the time. John A. Chapman, general manager, and J. A. Best, assistant to the sales manager, will be there as time permits.

•

LUFKIN FOUNDRY AND MACHINE COMPANY
Lufkin, Texas

Block 3 (outside)

EXHIBIT: The following equipment will be shown:

A TC-OA-60 Unit, driven by a single flywheel 40-hp., single-cylinder, Cooper-Bessemer engine.

A 9-ft.-stroke twin-crank assembly, equipped with No. 51 gear box, driven by a General Electric motor.

A TC-2A-26 assembly, driven by a CHK Waukesha engine.

A TC-3-18 assembly, driven by a No. 300 McCormick-Deering engine.

A TC-5-7 assembly, driven by an XAH Waukesha engine.

A TC-6-5 assembly, driven by a 2-cylinder Hercules engine.

Will also show No. 17 jack, single crank No. 31 unit, counterbalanced stroke post complete with knockoff, and No. 5 gear box cut away to show the operation and construction of the gears.

Representatives: D. A. Reid, Tulsa, Oklahoma; George Henson, Great Bend, Kansas; L. A. Little, Dallas, Texas; W. C. Trout, Lufkin, Texas; W. W. Trout, Lufkin; C. B. Edwards, Houston, Texas; A. B.

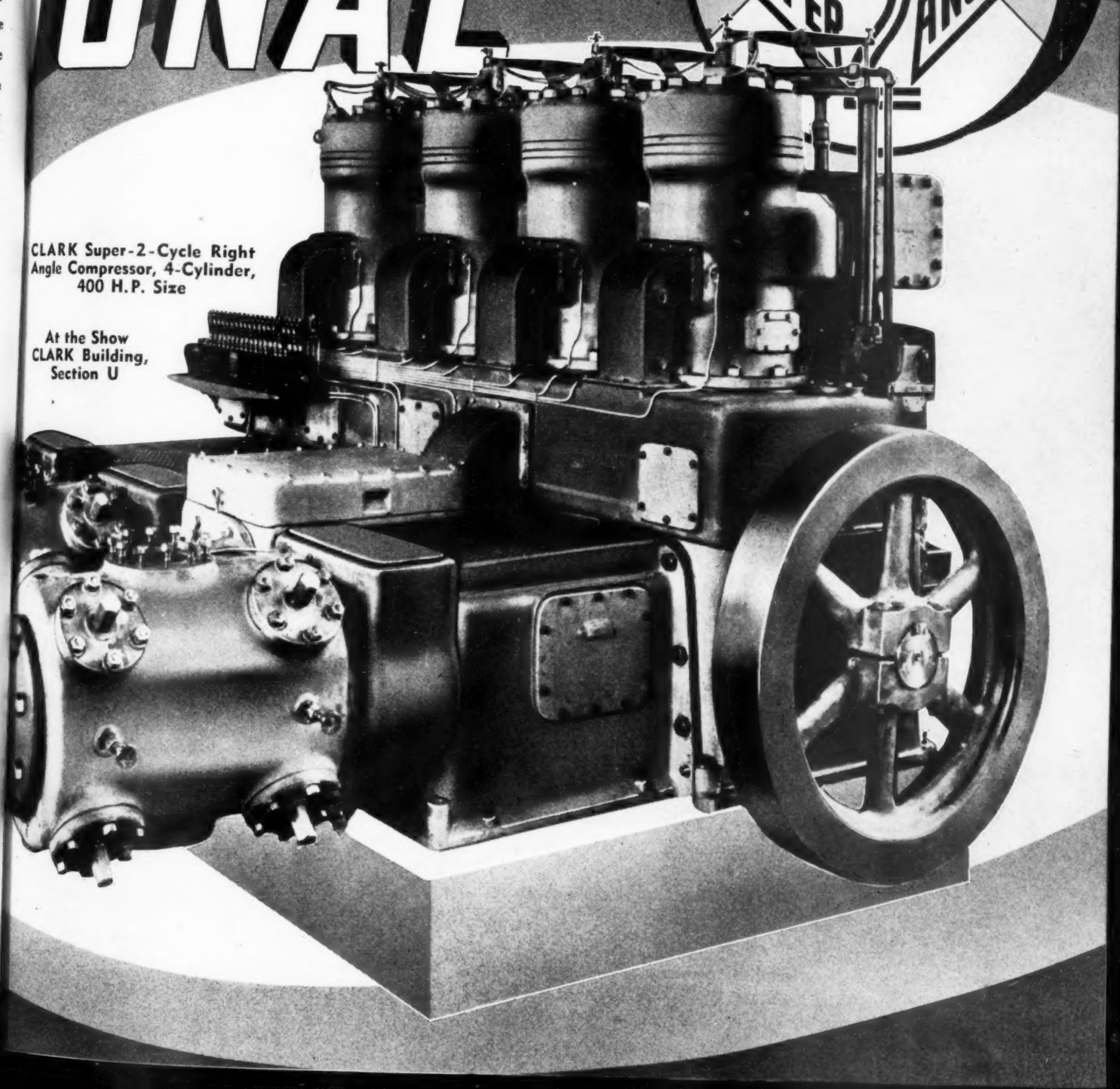
Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

THE 1936 SHOW!

ears later

ONAL

SUPER 2 ANGLE



CLARK Super-2-Cycle Right Angle Compressor, 4-Cylinder, 400 H.P. Size

At the Show CLARK Building, Section U

Bennett, Kilgore, Texas; and C. S. Hardin, Shreveport, Louisiana.

THE LUFKIN RULE COMPANY
Saginaw, Michigan
Booths Nos. 83 and 84 Scientific and Technical Building

EXHIBIT: A complete line of tank gauging tapes, "Derrick" tapes, tank strapping tapes, and steel, stainless steel, and woven tapes for general measuring work, pocket tapes, steel tape-rules, folding rules of wood, steel, aluminum, and brass, miscellaneous wood and steel rules, also various items coming under the head of machinists or precision tools such as micrometers, calipers, dividers, gauges, combination squares, etc., will be shown.

Representatives: E. H. Meibeyer, Fred Hollingworth, and R. M. Benjamin.

THE LUNKENHEIMER COMPANY
Cincinnati, Ohio
Booths Nos. 67 and 68 Oklahoma Building

EXHIBIT: Display will include a complete line of bronze, iron, and steel valves, boiler mountings, lubricating devices, and other specialties suitable for oil-field and refinery service. Of special interest will be a line of 125-lb. bronze gate valves consisting of a double wedge disc pattern with taper seat and rising stem and a single wedge disc pattern with taper seat and non-rising stem.

Also featured in the exhibit will be a recently-developed line of bronze globe, gate, and check valves rated at 350 lb. SP and 1000 lb. GLP for oil-well drilling operations and high-pressure gas, oil, and hydraulic service, and steel valves for similar services.

Other equipment of interest will be plug type "Ferrenewo" and "Renewo" valves for 150 to 300 lb. SP.

The line of corrosion-resistant valves on exhibit will include "Causul" metal gates, "SA" valves, All-Iron "Ferrenewo," All-Iron "King-clip," and the Iron Automatic Liquid Gauge with stainless-steel trim.

Other products on display will be the "Alvor" constant level oil control, a device for maintaining the proper oil level in ring oiled bearings; non-metallic disc valves; new air nozzles; steel needle valves, etc.

Representatives: Harry A. Burdorf, sales manager; Jos. Waldeck, sales representative; Jos. A. Birkhead, sales representative; M. N. Stickel, sales representative; D. R. Davis, sales representative; and E. R. Tieberman, sales representative.

LYCOMING MANUFACTURING COMPANY
Williamsport, Pennsylvania
Booths Nos. 49, 259, 261, and 262 Oklahoma Building

EXHIBIT: A line of 4-, 6-, and 8-cylinder oil-well pumping engines with ratings of 20 to 50 horsepower. In addition, will be exhibited single-engine and dual-engine-driven generator plants. All of the power units and generator plants are designed to use natural gas as a fuel. Necessary parts, however, can be provided so the units will operate on either butane or propane. A dual-engine-driven plant operating on natural gas will be displayed during the show.

Representatives: E. D. Herrick, president; George G. Barr, Dallas, Texas, manager; W. G. Durant, engineering consultant; and Z. H. Whiteman, Jr., industrial division.

MACNICK COMPANY
Tulsa, Oklahoma
Booth No. 260 Oklahoma Building

MACWHYTE COMPANY
Kenosha, Wisconsin
Booth No. 69 Oklahoma Building

EXHIBIT: Will have on display specially designed wire lines for rotary drilling, and cable-tool drilling. These will include drilling lines, sand lines, cleaning out lines, winch lines, and special slings. Of interest to pipe line contractors will be the special hoisting lines and special braided wire rope slings for the handling of pipe. These braided wire rope slings are made from endless elements of wire rope and are as flexible as manila rope, and about one-sixth the weight of chain, but with the strength of wire rope, the makers state. In addition, grommets or endless wire rope will be on display.

Representatives: H. M. Robinson; F. J. Nelson, advertising manager; H. E. Sawyer, vice-president and treasurer; William C. Russell, wire rope engineer; F. E. Bennett, Texas representative; and Goodwin Johnston, Texas representative, and others will be in attendance at the booth.

MAGNETO IGNITION COMPANY, INC.
Tulsa, Oklahoma
Booth No. 132 Oklahoma Building

EXHIBIT: Products to be exhibited include: Wico magnetos, K-W magnetos, Bosch magnetos, American Bosch magnetos, Bendix magnetos, Edison Splitdorf magnetos, Fairbanks-Morse magnetos, Eisemann magnetos, Willard batteries, Delco batteries, Sterling ignition cable, Stromberg carburetors, Bendix steering stabilizer, and Bendix brakes.

Representatives: R. E. Day and M. C. Elworthy.

MAGNUS CHEMICAL COMPANY
Garwood, New Jersey
Booth No. 54 California Building

MALONEY TANK MANUFACTURING COMPANY
Tulsa, Oklahoma
Block V (outside)

EXHIBIT: Display will consist of:

(1) Actual installation of a regular Maloney bolted steel tank with standard paint job consisting of priming coat of Red Chromated Iron Oxide paint and exterior finish coat of superior aluminum paint.

(2) Actual installation of a Maloney bolted steel tank with "double-hot-dip" galvanized coating, applied after fabrication.

(3) Actual installation of Maloney galvanized stairway and walkway.

(4) Installation of several Maloney separators, including one demonstration separator in action.

Representatives: J. S. Warren, vice-president; J. C. Highfill, secretary; and the following field representatives: L. D. Hess, Tulsa, Oklahoma; R. H. Guthrie, Seminole, Oklahoma; C. W. Stevens, Wichita, Kansas; Joe Portillo, Atlanta, Texas; E. G. Murphy, Houston, Texas; Jack Calloway, Corpus Christi, Texas; N. B. Garner, Wink, Texas; Carl Folkner, Artesia, New Mexico; and Roy Tarrant, Lafayette, Louisiana.

MANNING, MAXWELL AND MOORE, INC.
Bridgeport, Connecticut
Booth No. 19 Scientific and Technical Building

EXHIBIT: Complete display of Consolidated safety valves, Ashcroft pressure gauges, Hancock bronze and steel globe and angle valves, and American instruments, some of which will be in operation, including the company's remote transmission system for pressures and temperatures.

MANZEL BROTHERS COMPANY
Buffalo, New York
Booth No. 50 Oklahoma Building

EXHIBIT: Force feed lubricators for cylinder lubrication; and chemical feeders for injecting chemicals into oil lines when treating oil will be shown. Working models of lubricators and chemical feeders will be on display.

Representatives: Albert S. Isch, sales manager; and W. C. Jackson, oil-field representative.

MARMON-HERRINGTON COMPANY, INC.
Indianapolis, Indiana
Block W (outside)

EXHIBIT: Trucks used in the petroleum industry will be on display.

MARTIN-DECKER CORPORATION
Long Beach, California
Booth No. 15 Texas Building

EXHIBIT: On display will be the Quintuplex drilling control instrument, the individual type mud gauge, unitized mud gauge, Clipper weight indicator, and a new weight indicator, which will be on display for the first time at the Exposition.

Representatives: E. L. Decker, Pete Crawford, and Jack Clemens.

MASON-NEILAN REGULATOR COMPANY
Boston, Massachusetts
Booths Nos. 27 and 28 Scientific and Technical Building

EXHIBIT: Pressure, temperature, flow, and level control instruments, ball-bearing pressure regulators, and diaphragm control valves will be shown.

Representatives: F. K. Morrison, Paul Condit, Eric Bianchi, and C. W. Wood.

C. A. MATHEY MACHINE WORKS
Tulsa, Oklahoma
Booth No. 116 Oklahoma Building

EXHIBIT: Will display gas testing equipment, measuring line reels, and associated equipment.

Representatives: C. A. Mathey and L. D. Orton.

McCORD RADIATOR AND MANUFACTURING COMPANY
Detroit, Michigan
Booths Nos. 72 and 73 Oklahoma Building

EXHIBIT: Complete line of McCord lubricators for pumping and drilling engines, as well as chemical pumps, will be on display. In addition, a new development will be shown for the first time—an improved type of engine cooling radiator unit suitable for many types of pumping and stationary engine requirements.

Representatives: W. J. Powers, sales manager, Lubricator Division; and J. S. Lyall, national field representative.

McKISSICK PRODUCTS CORPORATION
Tulsa, Oklahoma
Booth No. 90 Kansas Building

EXHIBIT: Tubing blocks, floor blocks, tubing catchers, and other specialties for petroleum production will be displayed.

Representatives: W. H. McKissick, C. B. Johnson, and H. V. Flemming.

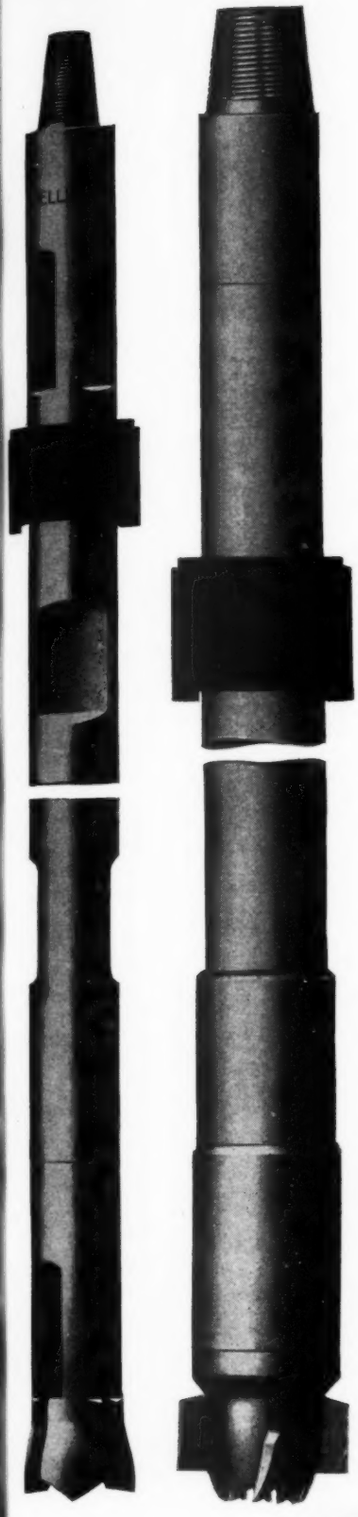
THE MECHANICAL RUBBER COMPANY
Passaic, New Jersey
Exhibiting with Continental Supply Company

MERCO CENTRIFUGAL COMPANY
San Francisco, California
See W-K-M Company Exhibit

THE MERIAM COMPANY
Cleveland, Ohio
See Westcott and Greis, Inc., Exhibit

MID-CONTINENT PETROLEUM CORPORATION
Tulsa, Oklahoma
Booth No. 19, Refiners and Marketers Building

THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending Exposition. Register immediately on arrival.



for CABLE TOOL ROTARY WIRE LINE CORING

A complete line of coring equipment, embracing types designed especially for each method of drilling; with interchangeable cutter heads for all formations. Designed, manufactured and used in its own coring service by the pioneer and recognized leader in oil well coring operations. Elliott Core Drills assure faster coring and maximum footage and recoveries in all formations at lowest cost and maintenance, with a minimum investment in coring equipment. Descriptive catalog of either type supplied on request.

ELLIOTT CORE DRILLING COMPANY
4731 E. 52nd Drive, Los Angeles, Calif., U.S.A.
Export Office: 420 Lexington Avenue, New York City, N.Y.

ELLIOTT CORE DRILLS

ELLIOTT CORE DRILLING COMPANY

MID-CONTINENT PUMP SUPPLY COMPANY
Tulsa, Oklahoma

Booths Nos. 32 and 33 California Building

EXHIBIT: Products to be exhibited: All types of Pacific and Oil States pumps, Moloy pump liners, chrome plungers, and streamlined valves for oil well pumps. There will be a demonstration of Pacific Moloy metal also.

Representatives: Roy A. Dunbar, president; Ralph Van Matre, vice-president and sales manager; T. G. Smith, A. D. Larson, M. W. O'Haver, "Bill" Graham, Jack Barton, Cliff Miller, Don Schnobrich, D. E. Harder, and Wm. Hubbard, jr.

●

MID-CONTINENT SUPPLY COMPANY
Fort Worth, Texas

Block 3 (outside)

EXHIBIT: Of interest to the production man: Cummins cold-starting full-Diesel engines; Bethlehem sucker rods; Pacific pumps; Multi-Seal rivets; Veelos "V" belts (adjustable); Famous brand mechanical rubber goods; Williamsport wire rope; and Electroloy machinery replacements.

Of interest to the transportation (pipe line) man: Cummins cold-starting full-Diesel engines; Harrisburg forged-steel products; Mid-Continent check valves; Mid-Continent automatic relief valves; Mid-Continent surge chamber; Electroloy machinery replacements; Ludlow gate valves; Multi-Seal rivets; Veelos "V" belts (adjustable); Famous brand mechanical rubber goods; Naylor Spiralweld line pipe; and Williamsport wire rope.

Of interest to the refining man: Cummins cold-starting full-Diesel engines; Harrisburg forged-steel products; Electroloy machinery replacements; Ludlow valves; Multi-Seal rivets; Veelos "V" belts; and Famous brand mechanical rubber goods.

Of interest to the marketer: Cummins cold-starting full-Diesel engines.

Of interest to the drilling man: Cummins cold-starting full-Diesel engines; Allis-Chalmers drilling rigs; Wilson drilling rigs; Mid-Continent Diesel Utility Unit (for drilling rigs); Emsco brake lining; Harrisburg slush pump liners; Multi-Seal rivets; Veelos "V" belts (adjustable); Naylor Spiralweld surface casing; Famous brand rotary hose; and Williamsport wire rope.

Representatives: K. W. Davis, president; D. H. Thornbury, vice-president; J. A. Daugherty, vice-president; J. C. Halbert, secretary-treasurer; F. John, purchasing agent; R. O. Moore, general merchandising manager; P. J. Dasey, sales engineer; C. D. Helm, sales engineer; J. E. Snoddy, manager automotive sales; A. S. George, representative; J. B. Chambers, southern district manager Cummins Engine Company; T. M. Cone, designing engineer; H. E. Hamilton, district sales manager; W. I. West, district manager, Houston, Texas; O. A. Schilling, representative; H. McMurry, manager, Houston; R. L. McAnally, manager, Kermit, Texas; F. R. Files, manager, Kilgore, Texas; G. H. Canterbury, manager, Lake Charles, Louisiana; G. C. Colwell, manager, Lisbon, Louisiana; A. E. LeClaire, manager, Monahans, Texas; R. C. Tucker, district manager, Odessa, Texas; T. P. Tarwater, manager, Odessa; G. A. Wead, manager, Refugio, Texas; C. M. Fleeman, manager, Rodessa, Louisiana; G. W. Walters, manager, Seagraves, Texas; S. W. Backus, district manager, Shreveport, Louisiana; G. R. Brooks, manager, Turnertown, Texas; F. J. Spurlock, district manager, Tyler, Texas; O. B. Albritton, district manager, Wichita Falls, Texas; and J. E. Everroad, sales engineer.

MIDWEST PIPING AND SUPPLY COMPANY, INC.
St. Louis, Missouri

Exhibiting with Frick-Reid Supply Corporation.

EXHIBIT: Display will include fabricated pipe, welding fittings, and specimens of alloy welds.

Representatives: A. G. Stoughton, president; F. C. Fantz, vice-president; C. S. Simon, Tulsa representative; C. W. Cryer, Houston representative; and J. L. Jacobson, Welding Fittings Division.

●

MINE SAFETY APPLIANCES COMPANY
Pittsburgh, Pennsylvania

Booths Nos. 48 and 49 Oklahoma Building

EXHIBIT: Will display complete line of safety equipment, including M. S. A. hose masks, tank gaugers' masks, gas detecting and recording instruments, Skullgard protective hats, safety clothing, and first-aid material.

The M. S. A. Explosimeter, for detecting and recording the concentration of combustible gases, will be a feature of the exhibit. Other new M. S. A. products include the M. S. A. Lamb Air-Mover, a portable, practical emergency ventilating device; M. S. A. Anatomical Shirt, a new idea in first-aid training; M. S. A. Salt Tablet Dispenser; and M. S. A. All-Weather First-Aid Kits, providing individual treatments in handy, compact form.

Representatives: H. W. Richards, H. L. Phillips, G. J. Gruber, G. L. Seth, and J. B. Davies.

●

MISSION MANUFACTURING COMPANY
Houston, Texas

Booths Nos. 91, 92, 93, 118, 119, and 120 Texas Building

EXHIBIT: The following products will be on display:

New Mission rotary slips, Model 36, having the time-proven principle of rolling dogs, which makes for faster handling of pipe as the dogs roll away from the pipe as it is pulled.

New Mission one pipe hinge-type slips that possess the same general advantages that distinguish the regular Mission slips.

Mission casing slips for handling larger sizes of pipe than the regular-type Mission slips.

Mission spool-type tubing spiders, embodying the rolling dog principle, and other features of Mission slips. It is a compact, self-contained unit that is always ready for instant operation.

Mission square bowl tubing spider for handling the longest strings of tubing; also constructed on the Mission rolling dog principle.

Mission Silver Top slush pump valves. Removable bushing takes the wear, thus making possible the use of the seat and valve body over and over again.

Mission valve seat pullers designed on the well-known wedge principle.

Mission slush pump pistons. Upkeep costs greatly reduced because of easily replaceable rubbers on a long lasting piston body, the manufacturers state.

Mission piston rods having super-strength core, testing 120,000 lb. per sq. inch. Have a file hard case that makes for long wear; carries an unconditional guarantee of full coverage against damage to pump should rod break.

Mission valveless swabs, tandem model: Entirely different in design from conventional type swab, the makers state. On down stroke half the rubber remains in fixed position and the other half is free to rise above and clear of the stationary half, allowing unrestricted fluid flow. This principle also prevents swab from blowing from the hole when pulling load as the gas pressure will open split rubbers, permitting the gas to by-pass, resuming its load without loss after the gas has passed. No loose line over derrick floor to endanger crew.

Representatives: W. B. Sharp, Dudley C. Sharp, W. T. Campbell, Johnny Best, J. H. Tucker, R. M. Garrison, R. B. Parrish, and Mission sales engineers from the Mid-Continent and Gulf Coast territories.

●

LEE C. MOORE AND COMPANY, INC.
Tulsa, Oklahoma

Booths Nos. 65 and 66 Oklahoma Building Block 8 (outside)

EXHIBIT: A rotary drilling derrick, the company's new type 9900 spudder, and pumping units in several sizes.

Representatives: E. S. Anderson; W. H. Payne, district manager, Dallas, Texas; G. A. Holloway, district manager of Kansas; C. L. Henry, chief engineer; H. J. Woolslayer, assistant chief engineer.

●

MOORLANE COMPANY, INC.
Tulsa, Oklahoma

Booths Nos. 151, 152, 153, 154, 155, 156, 157, and 158 Oklahoma Building

EXHIBIT: Display will include a complete line of pipe, valves, and fittings.

Representatives: Wm. D. Moorer, Egon Koehler, S. D. Hunt, and the company's entire sales force.

●

MORRISON BROTHERS
Dubuque, Iowa

Booth No. 6 Refiners and Marketers Building

●

MOTOR IMPROVEMENTS, INC.
Newark, New Jersey

Booth No. 7 Oklahoma Building

EXHIBIT: Purolator fuel filters and Purolator lubricating oil filters will be on display.

Representatives: H. B. Graham, sales engineer, Detroit, Michigan; Frank P. Herman, manager of factory equipment sales, and T. R. Collioud, district sales representative for the Southwest territory.

●

MUSKOGEE IRON WORKS, INC.
Muskogee, Oklahoma

Block 7 (outside)

EXHIBIT: The equipment displayed will consist of a derrick, pumping equipment, winches, and perhaps some smaller oil-field equipment.

Representatives: Frank Purdum and Frank McManus.

●

NATIONAL CARBIDE CORPORATION
New York, New York

Booth No. 30 Oklahoma Building

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NATIONAL CARBON COMPANY, INC.
New York, New York

See Union Carbide and Carbon Corporation Exhibit.

●

NATIONAL LEAD COMPANY
St. Louis, Missouri

Booth No. 46 Scientific and Technical Building

●

NATIONAL PUMP CORPORATION
Cincinnati, Ohio

Booth No. 5 Kansas Building

●

NATIONAL RADIATOR CORPORATION
Cast Products Division
Johnstown, Pennsylvania

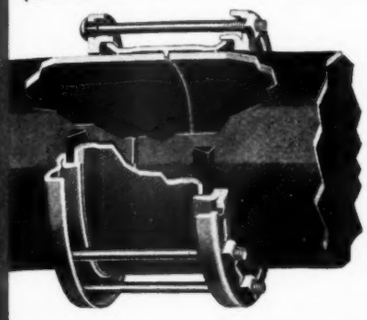
Booths Nos. 166 and 167 Oklahoma Building

EXHIBIT: Equipment to be displayed includes National sections for the condensing and cooling requirements of petroleum refineries. A newly-designed Mud-Leg Type National Oil-Rator for heating crude oil emulsions and pipe line oil. This equipment

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.

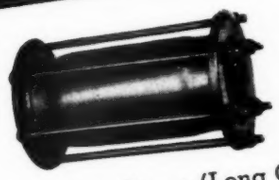
your Pipe-Line Work!

(Cutaway view of Dresser Coupling, Style 38)



*SIMPLICITY ...YES! ALSO:

1. PERMANENT TIGHTNESS—proved for 50 years, on 150,000 miles of pipe.
2. FLEXIBILITY—expansion, contraction, vibration, etc., are absorbed.
3. SPEED—typical examples: 4 min. for 5" size; 6 min. for 8"; 8 min. for 14" (two workmen).
4. STRENGTH—predetermined; joints safely withstand any specified pressure.
5. TRUE ECONOMY—a truly lower joint cost throughout life of line, plus salvage.



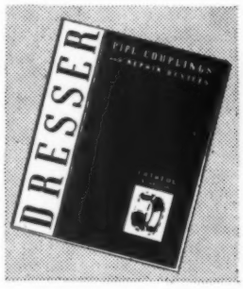
Dresser Long Sleeve (Long Coupling), Style 40, has longer body to span variations in space between pipe ends. Widely used for quick field hook-ups, closures, tie-ins, and cut-in work.

PIPE joints are the real "bottle-neck" of your pipe-line work. You know this if your own joint-making work has ever been held up by: (1) a single, slow operation; (2) dropping out of "key" workers; (3) difficulties in getting heavy machinery through swamps, etc.; (4) trying to supervise a crew spread out several miles; (5) delays due to wet ditches or bad weather.

You can get around all this by *simplifying* your joint-making operations!

With Dresser Couplings, most of the work is done before you start. All operations are standardized. Work goes forward uninterruptedly. You get "built-in" simplicity—which means *uniform,* fool-proof joints. Parts can go together in only one way—the permanently tight way! *Results:* all construction work is speeded up; costs are reduced; unforseen expenses, upset schedules, and uncertainties are eliminated.

For further details, write for our General Catalog No. 36, a virtual handbook on pipe joints. •S. R. DRESSER MFG. CO., BRADFORD, PA. *New York:* 230 Park Avenue; *Chicago:* Peoples Gas Building; *Houston:* Shell Building; *San Francisco:* 1038 Polk Street; *In Canada:* Dresser Mfg. Co., Ltd., 60 Front Street, West, Toronto, Ontario.



DRESSER

PIPE COUPLINGS

will be exhibited for the first time at the Tulsa Show.

Representatives: B. T. du Pont, manager Cast Products Division; and Edward Soph, district representative.

●

THE NATIONAL SUPPLY COMPANY
Toledo, Ohio

Block I (outside)

EXHIBIT: The equipment on display will be as follows: Complete line of single well pumpers and reduction gears, bandwheel and geared powers, vertical and horizontal Superior engines, Diesel-electric and Diesel-mechanical rotary rig drives, latest types Ideal rotary and drawworks, Ideal-Ajax steam drilling engines, Ideal power driven and steam slush pumps, Broderick boiler, and Ideal seismograph rig.

Representatives: Executive personnel will be in attendance.

●

NATIONAL TANK COMPANY
Tulsa, Oklahoma

Booths Nos. 96, 97, 98, 113, 114, and 115 Texas Building

EXHIBIT: Exhibit will consist of new displays of actual and model separators, treating installations, and other methods of handling production.

Representatives: Jay P. Walker, C. G. Wells, J. E. Richard, L. S. Allen, C. D. Laidley, and C. O. Glasgow.

●

NATIONAL TRANSIT PUMP AND MACHINE COMPANY
Oil City, Pennsylvania

Exhibiting with Frick-Reid Supply Corporation

●

NATIONAL TUBE COMPANY
Pittsburgh, Pennsylvania

Booths Nos. 136, 137, 138, 139, 140, 141, and 142 Oklahoma Building

EXHIBIT: Exhibit will consist of a special display demonstrating the advantages of the rounded form of thread as applied to casing and tubing, and a display of oil-country products, including:

National A.P.I. casing and tubing.

External upset tubing with high-tensile coupling.

Special alloy casing with high-tensile coupling.

Drill pipe with various types of new and regular design tool joints.

Seamless line pipe—sizes ⅛ in. to 28 inch.

National Duroline pipe.

Plain carbon and various alloy-steel tubes for refineries.

Representatives: J. E. Goble, H. J. Morlang, W. F. McConnor, J. B. Graham, W. C. Moser, F. R. Braman, J. R. Boax, F. A. Marsh, E. E. Smith, and W. L. Schaeffer.

●

NEW BEDFORD CORDAGE COMPANY
New York, New York

Exhibiting with Continental Supply Company

●

NEW DEAL SPECIALTY COMPANY
Okmulgee, Oklahoma

Block L (outside)

EXHIBIT: New Deal pipe cleaning machines, and Duo-Hydraulic pipe straightening and pipe bending machines will be displayed.

Representative: Ben Colchensky.

●

NORMA-HOFFMAN BEARINGS CORPORATION
Stamford, Connecticut

Booth No. 8 Texas Building

EXHIBIT: Will display representative samples of the company's various types of ball, roller, and thrust bearings, as well as pillow blocks and mountings. Plan to feature heavy-duty cylindrical roller bearings, needle roller bearings, and enclosed grease-packed ball bearings of the cartridge and similar types.

Representatives: H. J. Ritter, sales manager; D. E. Christopher, sales engineer, and T. E. Rounds, engineering department.

●

W. C. NORRIS, MANUFACTURER, INC.
Tulsa, Oklahoma

Block X (outside)

EXHIBIT: Equipment on display will include Norrisized swaged and bull plugs, pumping equipment, tubingheads, and stuffing boxes.

Representatives: W. C. Norris, D. S. Bowers, J. H. Eustice, E. D. Forquer, R. A. Colgin, O. R. Kinnaman, H. Virgil Flemming, Everett Ray, N. B. Heywood, William G. Davidson, A. W. Branscum, H. H. Paris, William R. Barney, Ray Sexton, E. B. Wilson, C. H. Benedum, C. O. Jones, and J. E. Giles.

●

WM. W. NUGENT AND COMPANY, INC.
Chicago, Illinois

Booths Nos. 171 and 172 Oklahoma Building

EXHIBIT: Will have on display pressure and gravity-type oil filters for fuel and lubricating oil, sight feed valves, oil pumps, oiling devices, sight flow indicators, etc.

Representatives: John Vocelka, C. D. Nugent, and D. S. Deem.

●

OAKITE PRODUCTS, INC.
New York, New York

Booths Nos. 10 and 11 California Building

EXHIBIT: Display will feature newly-developed materials for ridding the water jackets of Diesel engines and other water-cooled equipment of hard water scales and rust deposits. The Hot Flow-On Method (Patented by Oakite Products, Inc.) of stripping paint from storage tanks also will be illustrated. A third operation of major importance to be displayed will be improved methods of cleaning heat exchanger equipment.

Representatives: J. A. Carter, assistant manager; J. C. Leonard, Chicago division manager; J. R. Whyte, Tulsa representative; W. A. Dowen, Houston representative; and A. W. Schulte, Dallas representative.

●

WALTER O'BANNON COMPANY
Tulsa, Oklahoma

Booths Nos. 104 and 105 Texas Building

EXHIBIT: Equipment displayed will include rod (insert) pumps, tubing pumps, valve cups, balls and seats, sucker rod sockets, polished rod clamps, safety rod elevators, rod line weights, tubing tongs, automatic tubing spiders, and sucker rod and tubing hooks.

Representatives: Walter O'Bannon, E. B. Beard, H. P. Gillespie, W. J. Hennigan, R. L. Hodshire, E. W. Jacobia, F. H. Krug, Walter O'Bannon, Jr., C. M. Peters, L. B. Rowsey, H. D. Smith, and Blake Caldwell.

●

THE O. C. S. MANUFACTURING COMPANY
Coffeyville, Kansas

Block 5 (outside)

EXHIBIT: Pumping units from 10 hp. to 100 hp., will be on display. The 100-hp. unit is said to be the largest capacity unit on the market. This particular unit is unusual in that it is equipped with double beam, double samson posts, and double pitman, the crosshead being situated over the well, according to the manufacturers. A reversing countershaft for adapting internal combustion engines to rotary drilling will also be on display.

Automatic Drilling: One of the most novel advancements in rotary drilling also will be on exhibit in the form of an automatic weight control for automatic drilling. This machine has been in the process of development for the last eight years and is being offered for the first time to the industry. The machine is adaptable to standard rotary drawworks and automatically feeds and retrieves, maintaining a predetermined amount of weight on the bit as set by the driller, it is stated. A demonstration of this machine will be made to all those interested in the development. W. A. Loomis will be in charge of this demonstration and C. B. Morton, sales manager of the company, will be in charge of the rest of the exhibit.

Representatives: C. B. Morton, W. A. Loomis, D. R. Brown, D. C. Myers, W. P. Turner, F. D. Stanley, C. A. Anderson, John F. Schuetz, James Q. Callaway, A. G. Evans-Lombe, H. B. Dick, LeRoy Williams, D. O. (Ted) Larkin, R. D. Ekstrand, D. E. Hazlewood, Melvin L. Dick, Joe Kilchenstein, Ben Palamountain, John Kountz, D. M. Cade, A. L. Mann, Harold McSpadden, Tom Scott, W. J. Slaughter, Charley Miller, Glen Wilson, and C. M. Daniels.

●

THE OHIO OIL COMPANY
Findlay, Ohio

Booths Nos. 33 and 34 Refiners and Marketers Building

EXHIBIT: Merchandise displayed will be packed goods of Marathon and Linco products.

Representatives: J. P. Hughes, J. H. Wilson, J. O. Weber, and C. H. Blue.

●

THE OHIO STEEL FOUNDRY COMPANY
Lima, Ohio

Booths Nos. 76 and 77 Texas Building

EXHIBIT: Equipment displayed will consist of various designs of refinery return bends, together with refinery tube supports. The return bend exhibit will feature special Type 2000 sectional fitting and Type 1600 special box fitting.

Representatives: W. J. Hayes and B. W. Vinson.

●

OIL CENTER TOOL COMPANY
Houston, Texas

Booth No. 16 Kansas Building

EXHIBIT: Equipment exhibited will include a full line of casingheads and tubingheads, high-pressure forged steel fittings, adjustable and quick-change chokes, a full line of blowout preventers, and probably a Christmas tree or two.

Representatives: A. J. Penick, B. V. Fisher, Walter Burke, W. C. Johnson, Paul Baimbridge, Carl Mount, I. C. Wells, C. J. Hillman, H. S. Perry, H. D. Start, and Frank Quaidy.

●

THE OIL WELL IMPROVEMENTS COMPANY
Tulsa, Oklahoma

Booths Nos. 33, 34, and 35 Texas Building

EXHIBIT: Display will consist of Orbit drilling and flow line valves, universal joints for Orbit valves, control casingheads, roller and plunger oil savers, Apex and Nolos stuffing boxes, Berry casingheads, and "lubricating-in" equipment for drilling-in wells under pressure with cable tools.

Representatives: Alf G. Heggem, Ed Ligon, Don Blevans, Paul Hodges, Herman Smith, W. O. Ligon, Phil Cline, and J. Mumford.

●

OIL WELL SUPPLY COMPANY
Dallas, Texas

Block 2 (outside)

EXHIBIT: On display will be a complete line of steam-saving rotary-drilling machinery, including:

Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

"Oilwell" portable superheated steam generator.

Completely unitized boiler-feeding hook-up including the "Oilwell" feedwater heater-pump unit.

Royal Type 3-C water softener.

"Oilwell" vertical twin-cylinder steam engines with hand-controlled variable cut-off.

Double engine drive comprised of two "Oilwell" vertical twin steam engines. The engines operate independently for driving pump and rotary and in tandem for hoisting.

"Oilwell" No. 72715 rotary-drilling unit providing two-speed direct rotary drive from a No. 7 "Oilwell" vertical twin steam engine.

"Oilwell" oilbath rotaries.

Complete line of "Oilwell" and Wilson-Snyder power slush pumps, the largest being a No. 20-P (7¾ in. by 20 inches).

"Oilwell" and Wilson-Snyder steam slush pumps.

"Oilwell" steam and power pumps for boiler feeding and general service.

"Oilwell" swivels, crown blocks, and streamline traveling blocks.

Single-crank and twin-crank pumping units—several sizes of each type.

A complete line of single-crank geared powers, including 30-, 50-, 80-, 100-, and 150-hp. sizes.

Di-Hard exhibit, including slush pump liners and other applications of Di-Hard.

Sucker rod and sub-surface equipment exhibit, including samples and tests of "Oilwell" sucker rods, and sub-surface pumps and parts.

Cable-tool drilling equipment, including "Oilwell" cable-tool drilling unit, and "Oilwell" super jars.

Superior sand pump exhibit.

Products of Plymouth Cordage Company.

Products of Thermoid Rubber Company.

Representatives: District sales managers and sales engineers.

●

O. K. MACHINE COMPANY
Tulsa, Oklahoma

Booths Nos. 130 and 131
Oklahoma Building

●

OKLAHOMA PORTLAND CEMENT COMPANY
Oklahoma City, Oklahoma

Booth No. 103 **Oklahoma Building**

●

OKLAHOMA RIG AND SUPPLY COMPANY
Muskogee, Oklahoma

Booth No. 108 **Oklahoma Building**

EXHIBIT: Hickory handles, wood gauge rods, and wire-bound containers will be shown.

Representative: S. D. Slaughter.

●

OKLAHOMA STEEL CASTING COMPANY
Tulsa, Oklahoma

Booths Nos. 46 and 47 **Texas Building**

EXHIBIT: Castings for oil industry.

Representatives: Sidney J. Moore and Ernest M. Newland.

●

OLIVER UNITED FILTERS, INC.
New York, New York

Booths Nos. 56 and 57
Scientific and Technical Building

EXHIBIT: The major piece of equipment on display will be the Oliver Precoat Filter. This filter is for use in refineries in place of filter presses for handling contact clays and other products. It operates continuously. First a precoat of filter aid is built up on the drum, then the products handled are fed into the tank when a thin film of solids forms on the surface and is carried around to the discharge point. Here is the unusual feature: a traveling knife-edge shaves off a thin film of solids. Thus, a fresh surface of filter aid is presented at all times for removal of solids from the product handled, the makers state. It takes one-half to three-fourths of an hour to build up the precoat; the filtering cycle lasts for days. The advantages claimed are: long operating cycle, less oil in the filter cake, less manual labor and supervision, clarification with one pass, cake easily disposed of, and long filter cloth life.

Representatives: H. F. Oswald, T. G. Laney, and G. E. Shaw.

●

THE OSTER MANUFACTURING COMPANY
Cleveland, Ohio

Booths Nos. 59, 60, and 61
Oklahoma Building

EXHIBIT: Display will consist of a No. 706-OF Wilco Oil Field Special Machine, which has a capacity covering all sizes up to 6⅝-in. O. D. and is capable of cutting a long, correctly tapered A. P. I. thread on all sizes within its range without the use of a taper attachment. There also will be on exhibit the Tom Thumb line of portable and semi-portable pipe and bolt machines and a very complete assortment of hand pipe threading tools for oil-field use, as well as the company's No. 825 Tom Thumb chaser grinder.

Representatives: Arthur S. Gould, vice-president; H. C. Gardner, southwest district representative; L. M. Gardner, representative; and S. Piascik, demonstrator.

●

OTIS PRESSURE CONTROL, INC.
Dallas, Texas

Booths Nos. 224 and 225
Oklahoma Building

EXHIBIT: Otis removable bottom-hole choke and mixing valve, Otis snubbing equipment for the running and pulling of pipe under pressure, Otis square kelly drilling head and pressure-operated union for drilling-in under pressure control, and Otis tubing, drill stem, and casing plugs.

Representatives: I. A. Miller, V. L. Forsyth, and J. C. Luccous.

●

THE PALMER COMPANY
Cincinnati, Ohio

Booth No. 60
Scientific and Technical Building

EXHIBIT: Display will consist of thermometers used in the oil industry, showing the company's Red-Reading-Mercury feature. In addition, complete equipment and a skilled workman will be provided to show "How Thermometers Are Made." As very few ever have the opportunity of visiting a thermometer factory, this will be an opportunity to watch thermometers being manufactured.

Representatives: Bartlett Palmer, W. C. Jackson, Carl Gast, Frank Esch, and William Daley.

●

THE PARKERSBURG RIG AND REEL COMPANY
Parkersburg, West Virginia

Booth No. 1 **Texas Building**
Block 3 (outside)

EXHIBIT: The Parkersburg Hydronumatic pumping unit will be on display.

Representatives: J. M. Crawford, chairman of board of directors; C. A. Ruf, vice-president and general manager; P. L. Brooks, sales manager; H. L. Dickson, district manager; Charles Ferguson; H. A. Barnes; and E. F. Speiden.

PATTERSON-BALLAGH CORPORATION, LTD.
Los Angeles, California

Booths Nos. 93 and 94 **Kansas Building**

EXHIBIT: Will display casing protectors, drill pipe stabilizers, wire-line guides, safety mud guns, and installation equipment.

Representatives: J. C. Ballagh, J. M. O'Melveny, T. M. Smith, Jr., L. M. Jewett, R. C. Medearis, Ray Morris, Ross Mauldin, and W. B. Gardner.

●

PETROLEUM ELECTRIC POWER CLUB
Booths Nos. 17 and 18 **California Building**

EXHIBIT: Booths will be used as a place for representatives to meet and talk with those interested in power for producing, pipe line, and refining purposes.

Representatives: E. L. Robinson, Gulf States Utilities Company, Beaumont, Texas; F. M. Austin, Houston Lighting and Power Company, Houston, Texas; O. W. Jones, Central Power and Light Company, Corpus Christi, Texas; P. M. Cordell, Texas Electric Service Company, Fort Worth, Texas; W. G. Moore, Texas Power and Light Company, Dallas, Texas; J. E. Elliott, Southwestern Gas and Electric Company, Shreveport, Louisiana; Geo. Weckel, Kansas Gas and Electric Company, Wichita, Kansas; F. A. Graham, Kansas City Power and Light Company, Kansas City, Missouri; H. E. Roberts, The Empire District Electric Company, Joplin, Missouri; C. N. Robinson, Public Service Company of Oklahoma, Tulsa, Oklahoma; and W. H. Stueve, Oklahoma Gas and Electric Company, Oklahoma City, Oklahoma.

●

THE PETROLEUM ENGINEER
Dallas, Texas

Block 2 (outside)

●

PHILLIPS PETROLEUM COMPANY
Bartlesville, Oklahoma

Booths Nos. 1 and 2
Refiners and Marketers Building

●

PITTSBURGH EQUITABLE METER COMPANY
Pittsburgh, Pennsylvania

MERCO NORDSTROM VALVE COMPANY
San Francisco, California

Booths Nos. 35, 36, 37, 38
Scientific and Technical Building

EXHIBIT: Display will consist of:

Emco orifice meters, Emco large capacity positive gas meters, Emco standard domestic gas meters, Emco McGaughey integrators, Emco gas regulators, for all types of service and all pressure ranges.

Liquid Meter Division: Cold water meters, salt water meters, hot water meters, oil and gasoline meters, and water meter provers.

Nordstrom lubricated plug valves for all services and pressure ranges, including complete line of full round opening valves.

Representatives: Pittsburgh Equitable Meter Company: Col. W. F. Rockwell, president, Pittsburgh, Pennsylvania; Frank B. Wolfe, vice-president, Pittsburgh; E. A. Johnson, national representative, Pittsburgh; A. D. MacLean, chief engineer, Pittsburgh; Capt. A. E. Higgins, vice-president, Pittsburgh; C. R. Zeskey, Kansas City, Missouri; Orville Cochrane, Kansas City; P. C. Kreuch, Chicago, Illinois; C. H. Wyman, Chicago; Z. A. Stanfield, Memphis, Tennessee; D. D. Foster, Pittsburgh; O. W. Barnett, Shreveport, Louisiana; C. R. Parker, Fort Worth, Texas; C. K. Madison, Houston, Texas; W. J. McArt, Oklahoma City, Oklahoma; Roy R. Bush, Tulsa, Oklahoma; J. H. Baker, Tulsa; L. R. VanArs-

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

dale, Tulsa; A. J. Kerr, Tulsa; J. L. Cottrell, Tulsa; and F. N. Dillman, Tulsa. Merco Nordstrom Valve Company: E. E. Hedene, chief engineer, Oakland, California.

●

PITTSBURGH STEEL COMPANY
Pittsburgh, Pennsylvania

Booths Nos. 4, 5, and 6 Texas Building

EXHIBIT: Will display Pittsburgh seamless steel casing, drill pipe, oil-well tubing and line pipe, including Pittsburgh special double-seal casing, Pittsburgh extra clearance casing, Pittsburgh special double-grip drill pipe in internal upset and in external upset internal flush types in addition to the regular A. P. I. types of oil-country tubular goods.

Representatives: C. V. Lally, manager of sales, seamless steel tubes; E. J. Protin, manufacturing representative; Thomas G. Stitt, chief inspection engineer; Elmer T. Wible, advertising manager; S. E. Elder, district sales manager, Tulsa office; A. S. Vandervoort, Jr., district sales manager, Houston office; Wallace H. Rowe, Jr., district sales manager, Los Angeles office; G. W. Novak, field engineer; J. Wais, Jr., field engineer; and W. B. Baylor, field engineer.

●

PLYMOUTH CORDAGE COMPANY
Plymouth, Massachusetts

See Oil Well Supply Company Exhibit.

●

PODBIELNIAK CENTRIFUGAL SUPER-CONTROL COMPANY
Chicago, Illinois

Booths Nos. 22 and 23
Scientific and Technical Building

●

PORTABLE RIG COMPANY, INC.
Houston, Texas

Block Y (outside)

EXHIBIT: Portable Rig Company will have in operation its Model R-876 portable rig, which includes fully-enclosed drawworks, two engines, compounding drives, and substructure. A pump provides force-feed lubrication to all chains, bearings, sprockets, and shafts. Self-energizing brakes are watercooled by circulation in shoes attached to bands. Heavy-duty friction clutches on drum and rotary shafts allow maximum power of engines to be utilized when most needed. Heavy-duty herringbone gear transmission provides four forward and three reverse speeds. Dual engine drive (150 or 180 hp. gasoline, natural gas, or Diesel fuel) permits power of both engines to be compounded into drawworks or pumps. Air compressor included in the unit is used to engage and disengage engine clutches. Substructure, allowing either one or two pumps to be set on ground level, fits any height derrick, and provides walkway around entire unit.

Representatives: L. E. Hodges, L. D. Cain, J. L. Kluppel, W. S. Lightbourn, E. R. Poole, J. P. Morrow, F. A. Chance, D. C. Gassoway, L. A. Lombard, H. D. Robinson, Val R. Wittich, jr., New York representative, and Chas. D. Wagner, president, Wagner-Morehouse, Inc., representatives on the Pacific Coast.

●

WM. POWELL COMPANY
Cincinnati, Ohio

Booths Nos. 45, 46, 47, and 48
Scientific and Technical Building

EXHIBIT: Display will be of wet hose nozzles for dispensing gasoline, valves for bulk stations, pipe line valves, steam valves, high-pressure high-temperature refinery valves, and low-pressure and control valves for refinery service.

Representatives: James Coombe, vice-president; E. K. "Ted" Pierce; H. P. MacGregor; and Wm. Heilig.

THE PRESSURE DRILLING COMPANY
Houston, Texas

Booth No. 2 Texas Building

EXHIBIT: Display will include round grief stem drive bushing, round flush joint grief stem, full hole back-pressure valve, double streamline drill pipe, packing rubbers for stuffing box, and adjustable rotary flow bean.

●

PRODUCTIVE EQUIPMENT CORPORATION
Chicago, Illinois

Booth No. 20 Kansas Building

EXHIBIT: Full-size "Mud Hog" screen for rotary mud will be shown.

Representative: L. H. Lehman, sales manager.

●

PROGRESSIVE BRASS COMPANY
Tulsa, Oklahoma

Booth No. 11 Texas Building

EXHIBIT: Will display bronze, aluminum, copper, and special alloy castings; bronze replacement parts for oil-field engines and clutches; and brass, copper, and aluminum rods, sheets, and tubing.

Representatives: N. A. Doolittle, E. J. Thomas, and C. O. Beckett.

●

% PROPORTIONEERS, INC. %
Providence, Rhode Island

Booth No. 133 Texas Building

EXHIBIT: % Proportioneers, Inc. % and its associate, Builders Iron Foundry of Providence, Rhode Island, will exhibit together. It will be one of the group of booths in charge of Bailie Vinson of the Vinson Supply Company, Tulsa, Oklahoma. The equipment to be exhibited will include the following:

Proportioneers' apparatus for gum inhibiting and coloring of gasoline; acid treatment of lubricating oil; blending lubricating oil, gasolines, and asphalts; proportioning pumps, various sizes and types. In addition, various types of metering and control equipment for steam, water, gas, and dry materials as manufactured by the Builders Iron Foundry will be shown. These will include: Shunt Meter, Flo-Watch, Type M Venturi Meter, Chronoflo, and Electric Telemeter.

Representatives: R. P. Lowe, sales manager of the Industrial Department of both companies; and C. K. Perkins, New York City.

●

PYRENE MANUFACTURING COMPANY
Newark, New Jersey

Booths Nos. 38 and 39 Oklahoma Building

EXHIBIT: Phomaire Play Pipe, a foam-making water nozzle using Phomaide solution; and Wintergarde, a cartridge-type anti-freeze fire extinguisher will be displayed. Both are new products.

●

QUIGLEY COMPANY, INC.
New York, New York

Booths Nos. 1 and 2
Scientific and Technical Building

EXHIBIT: No. 2 electric furnaces in operation demonstrating Insulbrix, Insulblox, Insulag, and Quigley Specification fire brick.

Specification fire brick—first quality.

Insulbrix—insulating fire brick for temperatures to 3000 deg. fahrenheit.

Insulcrete—insulating refractory concrete for temperatures to 2500 deg. fahrenheit.

Insulag—refractory lagging for temperatures to 2200 deg. fahrenheit.

Insulblox—block insulation for temperatures to 2200 deg. fahrenheit.

Triple-A protective coating—for severe industrial service.

Hytempite—plastic, air-setting refractory cement.

Q-Chrome—neutral base refractory cement.

Q-Chromastic — plastic, super-refractory surfacing mortar.

Q-Seal — joint-sealing compound, high-pressure lines.

Representatives: D. F. McMahon, H. C. Thayer, J. D. Lawrence, J. W. Riddle, and C. E. Gischel.

●

J. P. RATIGAN
Los Angeles, California

See Frick-Reid Supply Corporation Exhibit

●

THE RAYBESTOS DIVISION OF RAYBESTOS-MANHATTAN, INC.
St. Louis, Missouri

Exhibiting with Frick-Reid Supply Corp.

EXHIBIT: Raybestos Silver Edge brake lining will be on display.

Representative: Kinsey Burr.

●

RECTOR WELL EQUIPMENT COMPANY, INC.
Fort Worth, Texas

Booth No. 1 Oklahoma Building

EXHIBIT: Rectorheads in types HP, M, L, C, AH, AM, and EH, drilling flanges, cable-tool drilling head, and tubingheads will be displayed.

Representatives: L. L. Rector, R. V. Evridge, C. L. Cron, W. P. Knight, J. W. Massey, E. W. Brockman, M. L. Jackson, and C. W. Zartman.

●

REDA PUMP COMPANY
Bartlesville, Oklahoma

Block C (outside)

EXHIBIT: Several sizes of Reda pumps and motors, Reda oil-well cables, and automatic intermitting controls, will be displayed, and there will be a Reda unit in operation in a well at the booth.

Representatives: A. Arutunoff, P. E. Loye, F. Rees Flint, H. H. Duck, G. S. Schumacher, E. V. Guffey, and Dalton W. Lain.

●

REED ROLLER BIT COMPANY
Houston, Texas

Booths Nos. 2, 12, 13, 14, and 15
Texas Building

EXHIBIT: On display will be Reed rock bits, Reed Barrett-Robishaw drilling bit with wire-line retractable core barrel, Reed replaceable blade fishtail bits, Reed welded-in-blade drilling bits, Reed pilot hole opening bit, Reed reamers, Reed tool joints, Reed Kor-King core drill, and the Martin-Decker pump gauge, Martin-Decker Quintuplex, Martin-Decker "Clipper" Multiplex, and Martin-Decker measuring line weight. The Reed line of rotary engines, the Reed air-balanced pumping unit, the Reed non-lubricated plug valves, and pressure-drilling equipment also will be shown.

Representatives: W. L. Childs, R. G. Hamaker, Howard Book, L. T. Anderson, Geo. Harrington, Bill Nutto, Nathan Janco, Alex Vallance, Mr. Spiars, and H. O. Heller.

●

THE REFINERY SUPPLY COMPANY
Tulsa, Oklahoma

Booths Nos. 8, 9, and 10
Scientific and Technical Building

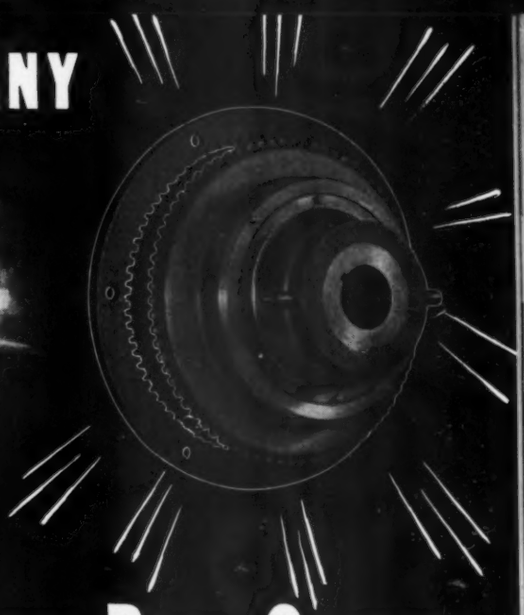
EXHIBIT: There will be a complete display of the company's specialties, in addition to the general line of scientific laboratory material.

Representatives: H. F. Goodenough, chief engineer and general manager; D. P. Thornton, chemical engineer; J. B. Okeson, sales manager; and T. C. Williams, store manager.

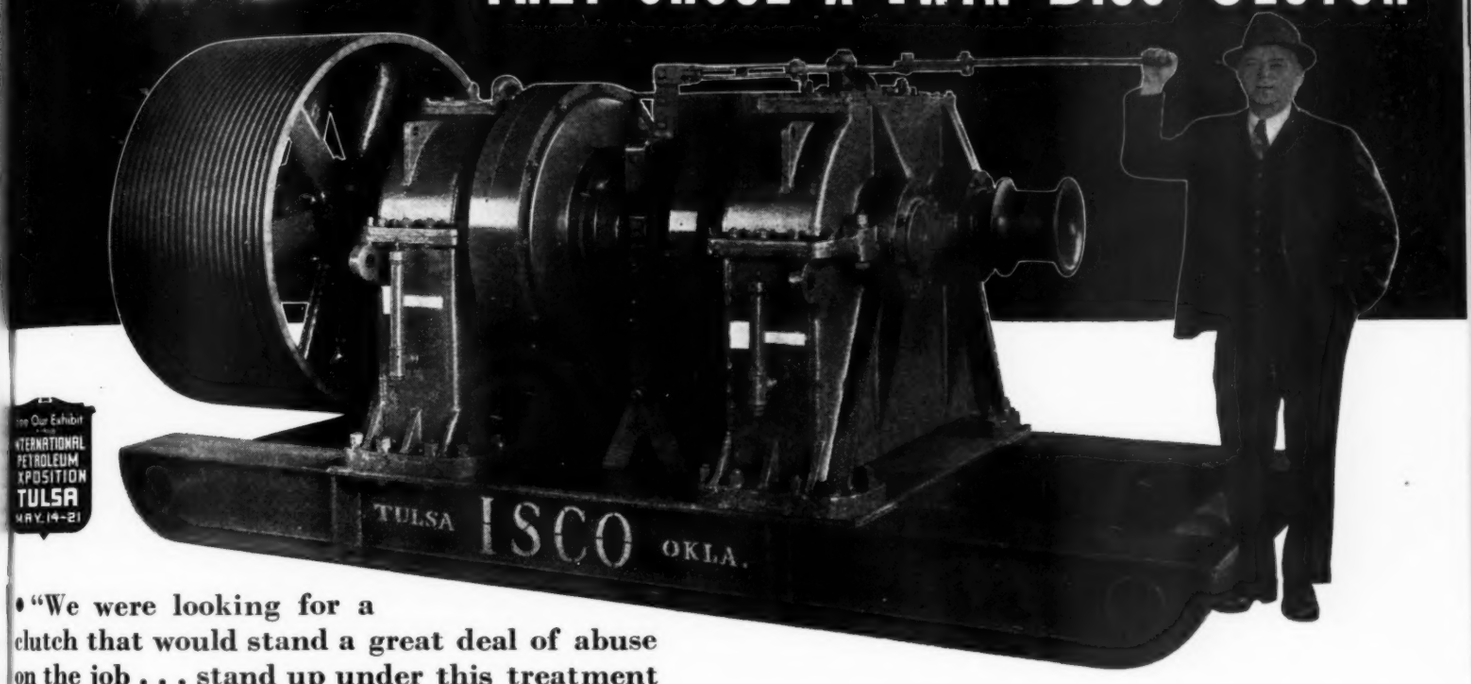
THE PETROLEUM ENGINEER Building on Drake Drive near 21st Street entrance is registration headquarters for those attending Exposition. Register immediately on arrival.

INTERNATIONAL SUPPLY COMPANY wanted—

a clutch to stand abuse, indefinitely, without repairs yet easy to operate...



THEY CHOSE A TWIN DISC CLUTCH



• "We were looking for a clutch that would stand a great deal of abuse on the job . . . stand up under this treatment indefinitely... and at the same time be easy to operate by the driller," said the engineers of the International Supply Co. That was the kind of a clutch they wanted for their *Isco* Reverse Clutch. And they got it . . . and more ...in the Twin Disc Model "E" Clutch.

On rotary drilling rigs using internal combustion engines operating in one direction only, the *Isco* Reverse Clutch is used between the engine and the draw works. It smoothly engages and disengages the power of one or both engines, in either forward or reverse direction.

With a 36-in. double plate Model "E" Twin Disc Clutch on the forward drive, and a 24-in. single plate Model "E" Twin Disc Clutch on the reverse drive—the *Isco* has a smoothness and ease of operation described by drillers as "more like steam than any other reverse clutch ever used."

Enclosed to permit operation in the open without either special housings or guards, Model "E" Twin Disc Clutch is available in single or two-plate assemblies, from 14-in. to 42-in. in diameter. *Write for Bulletin No. 108.*

TWIN DISC CLUTCH COMPANY
1329 RACINE ST. RACINE, WISCONSIN

SALES and SERVICE OFFICES
310 E. 4th ST., TULSA 2826 MAIN ST., DALLAS

TWIN DISC CLUTCHES

Write for specific recommendations. Engineering data on request

REGAN FORGE AND ENGINEERING COMPANY
San Pedro, California
Booth No. 43 California Building

EXHIBIT: No equipment will be shown, but catalogs and other literature pertaining to Regan equipment will be given away, and a representative will be present at all times to answer questions. The company's equipment consisting of crown and traveling blocks, blowout preventers, and casing hooks, will be shown in conjunction with the exhibit of the Bovaird Supply Company in their building.

Representatives: F. M. Kilmer, blowout preventer specialist; Ed C. Kirby, Mid-Continent salesman; Leo Dowse, Mid-Continent salesman; H. E. Scruggs, Houston office; and W. S. Proctor, manager, Mid-Continent Division.

●

JOSEPH REID GAS ENGINE COMPANY
Oil City, Pennsylvania
Exhibiting with Frick-Reid Supply Corporation

●

RELIANCE REGULATOR CORPORATION
Alhambra, California
See Westcott and Greis, Inc., Exhibit

●

REPUBLIC RUBBER DIVISION
Lee Rubber and Tire Corporation
Youngstown, Ohio
Exhibiting with Frick-Reid Supply Corporation and Bovaird Supply Company

EXHIBIT: Display will consist of transmission belting for oil fields, conveyor belting, rotary hose, and miscellaneous hose for the refining and producing divisions of the petroleum industry. These products are distributed in Mid-Continent oil fields by the Frick-Reid Supply Corporation and the Bovaird Supply Company. Stocks are carried at all stores to meet the requirements of the oil industry.

Representatives: N. M. Grove, Tulsa, Oklahoma, Mid-Continent representative; and C. H. Zieme, Youngstown, Ohio, service engineer.

●

REPUBLIC STEEL CORPORATION
Cleveland, Ohio
Booths Nos. 16, 17, 18, 19, 20, and 21 Texas Building

EXHIBIT: The Republic Steel Corporation's new heat-treated casing, which the manufacturers state insures greater setting depths for lighter weights at the same time maintaining the present safety factors, will be featured. Also featured will be belled-end casing for welding in the hole. Belled end joints, both welded and not welded, will be on display. An interesting display of oil-country products fabricated from Republic alloy steels also will be included in the exhibit.

Truscon Steel Company, a subsidiary of Republic, will have one of its standard steel buildings in the Republic exhibit.

Representatives: W. M. Neckerman, assistant vice-president in charge of operations; C. H. Elliot, assistant vice-president in charge of operations; J. E. Holmes, manager of sales, Pipe Division; G. W. Locke; M. B. Brown, assistant manager of sales, Pipe Division; G. F. Hess, assistant manager of sales, Alloy Steel Division; C. W. East, Houston district sales manager; Hoyle Jones, Tulsa district sales manager; M. J. Cauger, Tulsa district sales office; S. A. Knisely, director of advertising; and C. W. Ruth, assistant director of advertising.

●

REPUBLIC SUPPLY COMPANY
Tulsa, Oklahoma
Booths Nos. 74 and 75 Oklahoma Building

EXHIBIT: Various items of oil-field equipment.

Representatives: J. H. Brooks, J. C. Underwood, jr., A. V. Matheny, and R. J. Flood.

●

REVERE COPPER AND BRASS, INC.
New York, New York
Exhibiting with Frick-Reid Supply Corporation

EXHIBIT: Will feature condenser tubes and plates. In addition to the pictorial presentation of the manufacturing steps in the production of condenser tubes and plates, the company has constructed for its exhibit a special condenser tube plate showing the numerous ways of actually installing or inserting tubes in condensers. In all, 25 methods of tube insertion are depicted.

The exhibit also will feature as a matter of historical interest a wooden model made by Paul Revere from which he built the first Copper Rolling Mill in America in 1801. In 1804 Paul Revere sent his son and partner, Joseph Warren Revere, to Europe, and especially to England, to study the operating methods in the copper and other metal mills then in existence. The now historical passports, letters of introduction written by Paul Revere, and the note books of his son, replete with full hand drawings of English machinery and operations, are also a part of the interesting exhibit. They are pointed out as the first evidence of effort towards industrial research in America.

Representatives: W. H. Hitchcock, W. R. Weil, H. B. Stephenson, W. G. Seidlitz, G. A. Waterman, N. H. Lambert, and Wm. E. Duggan.

●

THE RIDGE TOOL COMPANY
Elyria, Ohio
Booths Nos. 28, 29, and 30 Texas Building

EXHIBIT: Display will include Ridgid wrenches, pipe cutters, die stocks, vises, compound leverage wrenches, pipe extractors, stud extractors, tubing cutters, and threading oil.

Representatives: W. L. Parcell, sales manager; R. C. Chamberlin, Seth W. Smith, Jas. B. Graham, and J. J. McIntosh.

●

ROBINSON ORIFICE FITTINGS COMPANY
Los Angeles, California
See Westcott and Greis, Inc., Exhibit

●

ROBINSON PACKER COMPANY
Tulsa, Oklahoma
Booth No. 5 Oklahoma Building

EXHIBIT: Oil and gas well packers and plugs will be shown.

Representatives: J. M. Wood and S. A. Tener.

●

ROLLWAY BEARING COMPANY, INC.
Syracuse, New York
Booth No. 58 California Building

EXHIBIT: A complete line of cylindrical roller bearings, both radial and thrust types, showing various types of bearing constructions particularly adapted to oil field equipment, will be on display.

Representatives: Schuyler Yates, Chicago, Illinois; C. W. McNeil, Houston, Texas; and D. A. Cant, Tulsa, Oklahoma.

●

ROYAL MANUFACTURING COMPANY
Tulsa, Oklahoma
Booth No. 30
Refiners and Marketers Building

EXHIBIT: The following equipment will be displayed: Royal portable Zeolite water softeners; Royal 900-deg. aluminum paint; Royal 700-deg. black paint; Royal tool-joint dressing; Royal C-X water jacket cleaner; Royal condenser cleaner; and Royal boiler treatments.

Representatives: F. W. Johns, W. R. Mallory, and J. V. McArthur.

WALTER RUSKA AND COMPANY, INC.
Houston, Texas
Booth No. 31
Scientific and Technical Building

●

SAFETY EQUIPMENT SERVICE COMPANY
Cleveland, Ohio
Booth No. 12 Oklahoma Building

●

SCINTILLA MAGNETO COMPANY, INC.
Sidney, New York
Booths Nos. 9 and 10 Oklahoma Building

EXHIBIT: Scintilla Magneto Company, Inc., and Zenith Carburetor Company, Detroit, Michigan, both subsidiaries of Bendix Aviation Corporation, will conduct a joint exhibit. Scintilla Magneto Company, Inc., will exhibit low fire hazard ignition equipment, including magnetos, battery ignitions, and spark plugs. The latest development is a new system of battery ignition specially developed for large stationary engines. Special features are low fire hazard construction and the elimination of long high-tension spark plug cables. Another feature will be the operation of magnetos and shielded spark plugs in an explosion chamber filled with inflammable gas. After the equipment has been operated in this explosive mixture the latter is purposely ignited to indicate its explosive qualities.

Representatives: A. J. Poole, J. H. Mayforth, and J. T. Lansing.

●

SEALED POWER CORPORATION
Muskegon, Michigan
Booth No. 54 Oklahoma Building

EXHIBIT: Piston rings for industrial engine replacement will be shown, consisting of compression and oil control rings for all types of industrial engines, compressors, pumps, etc.

Representatives: Paul C. Johnson, sales manager; and C. Allen Fulmer, Industrial Division sales manager.

●

SEISMOGRAPH SERVICE CORPORATION
Tulsa, Oklahoma
Booth No. 10
Scientific and Technical Building

EXHIBIT: Will display portable reflection seismograph instruments, the company's new pipe-line radio, Hayward automatic drilling mud samplers, Hayward continuous depth indicators for drilling wells, and other special equipment. In addition to the equipment exhibited on the Exposition grounds, there will be on display at the company's laboratory in Tulsa portable core-drilling and shot-hole drilling equipment, as well as standard seismograph equipment of all kinds.

Representatives: R. P. Green, W. L. Ducker, S. A. Scherbatskoy, G. H. Westby, and W. G. Green.

●

SERVICE STATION EQUIPMENT COMPANY
St. Louis, Missouri
Booth No. 69 Kansas Building

●

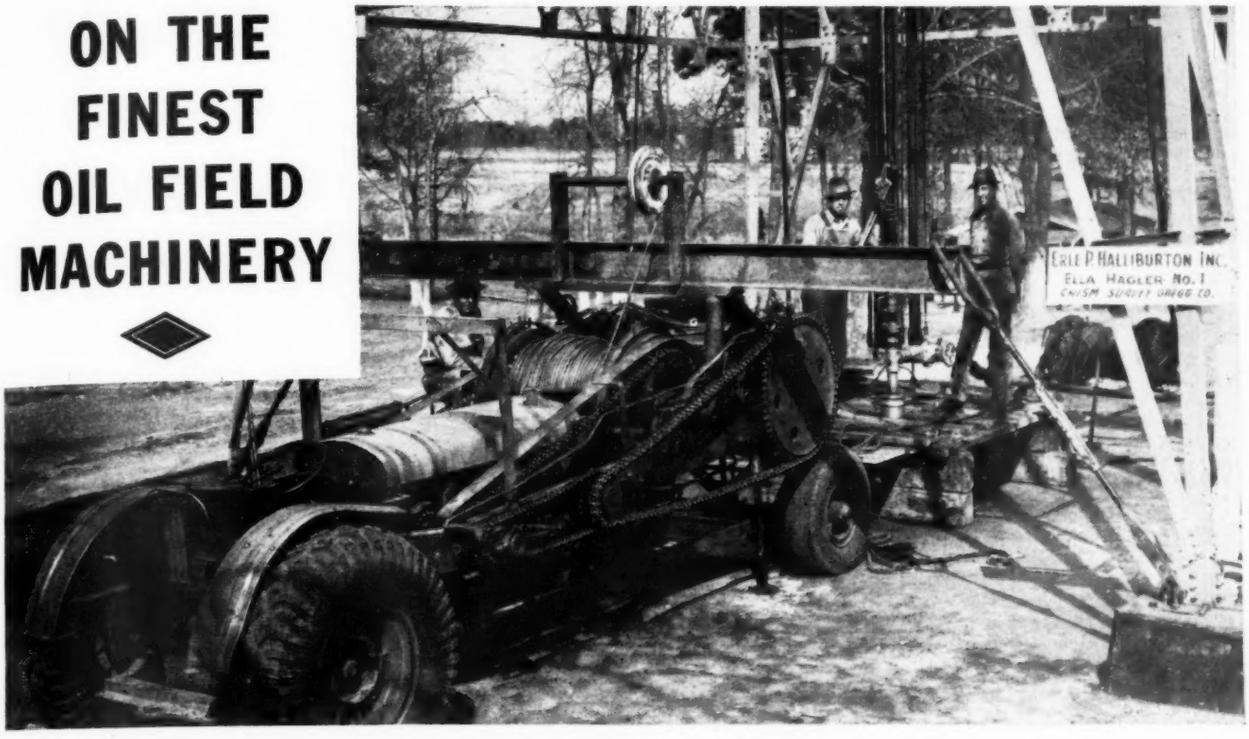
THE SHAFFER SPECIALTY COMPANY
Tulsa, Oklahoma
Block N (outside)

EXHIBIT: Will display Model 400 Rotary Drilling Unit consisting of drawworks power transmission unit and having dual Diesel engine drive. This unit is designed for drilling to 6000 feet.

Will also exhibit Model 250 Rotary Drilling Unit for slim hole or shallow drilling. This unit will include the drawworks power

Immediately on arrival at Exposition register at THE PETROLEUM ENGINEER Building, registration headquarters, on Drake Drive near 21st Street entrance.

ON THE FINEST OIL FIELD MACHINERY



Excerpts from East Texas Field Records on

FRED E. COOPER — ALLIS-CHALMERS MODEL U-E

Double Drum Winch Tractor Equipped with

DIAMOND ROLLER CHAINS

"Used in Talco for servicing wells up to November 1, 1936, wells 4300 feet deep, 2½" tubing.

★ ★

"Moved to East Texas field and serviced 33 wells 3600 feet, 2½" tubing. Cleaned out Phillips No. 5, using 3" cable tools. Job was completed in ten days, and included cleaning out ten feet of cavings originally in the hole in addition to the cavings coming in during the operation, also made three feet of new hole and set 40' liner.

★ ★

"Cleaned out Phillips No. 2 with 3" cable tools. This job was completed in six days, and consisted of the same operation as on Phillips No. 5, cleaning out ten feet of cavings and making three feet of new hole and setting liner.

★ ★

"Roaded machine back to Talco under its own power, 65 miles, for two weeks operation on pulling rods and tubing, trying to find best producing level.

★ ★

"Roaded machine 90 miles under its own power to Antlers, Oklahoma, to spud in on lease, inaccessible to heavy rotary tools. Left Talco on January 29, 1937, and spudded in and set conductor pipe on night of January 31st and saved lease. Used machine at Antlers for rigging up heavy diesel rig.

★ ★

"Roaded machine back to Talco under its own power a distance of ninety miles in seven hours including time for meals and other stops at Hugo, Oklahoma, and Paris, Texas.

★ ★

"On a hung tubing string in Hood No. 1, broke a ⅞", 60,000 pound test line trying to loosen tubing, also broke 2" steel bicket on two sheave traveling block, trying to free tubing on a straight lift. Then rigged up 3" cable tools and jarred 2½" tubing in two; drilled up remainder of tubing left in hole, cleaned out hole and drilled new hole from 4313 to 4351 with cable tools and set short string of 5½" pipe.

★ ★

"Moved to Kelley Well in Talco, pulled 300 feet of liner, cleaned well out with cable tools and set short string of 5½" pipe, perforated same, and finding no production, set cement retainer and plugged back to 45 feet; drilled out retainer and 24 feet of cement in thirty hours.

★ ★

"Roaded machine back to East Texas field and cleaned out Phillips No. 9, cleaned out nine feet of cavings and drilled six feet of new hole, in four days.

★ ★

"After Phillips No. 9 was cleaned out and back on flush production again, the machine handled the regular run of rod and tubing work, swabbing, etc., on all the East Texas field wells covering an area within a twenty-five mile spread.

★ ★

"Next clean out operation was on Phillips No. 8. This well was cleaned out with cable tools and plugged back. Drilled out cement retainer and 22 feet cement in thirteen hours.

★ ★

"Moved to Lacey lease following rotary drilling rig on drilling-in operations, with cable tools. Drilled in Lacey No. 11-A after bailing out hole, drilled 18 feet of cement and 13 feet of new hole in twelve hours. Bailed out Lacey No. 13-B, drilled 18 feet of cement and 9 feet of hole in six hours. Bailed Lacey No. 12 and drilled 16 feet of cement and 16 feet of hole in eighteen hours.

★ ★

"Moved to Loden lease, following rotary rig on drilling operations with cable tools. Bailed Loden C-11 and drilled twenty feet of cement and seven feet of hole in twelve hours. Bailed Loden C-12 and drilled sixteen feet of cement and eighteen feet of new hole in twenty hours.

★ ★

"Moved to Phillips lease and bailed Phillips No. 11 and drilled 27 feet of cement and twelve feet of new hole, and set liner through shale break in twenty-two hours. Bailed Phillips No. 10 and drilled thirty feet of cement and thirteen feet of new hole, and set liner in shale break in nineteen hours.

★ ★

"Moved machine to Hagler No. 1 for cleaning out with cable tools, where the photograph above was taken."

★ ★

The above resume of work has been compiled from the East Texas field records of Erle P. Halliburton, and in addition the machine has handled all regular lease work such as pulling rods and tubing, swabbing, filling slush pits, pulling trucks through mud, and general utility work.

★

Diamond Roller Chains have been standard equipment on Fred E. Cooper, Allis-Chalmers tractor winches from the start. Diamond Roller Chains play an important part in the establishment of records of performance and reliability on all kinds of oil field equipment. DIAMOND CHAIN & MFG. CO., 441 Kentucky Avenue, Indianapolis, Indiana. Tulsa, Okla.: 227 East 29th St.

★

DIAMOND ROLLER CHAIN

SEE OUR EXHIBIT • INTERNATIONAL PETROLEUM EXPOSITION, TULSA, MAY 14-21

transmission drive and dual Diesel engines.

A double-drum drilling and servicing unit incorporating a new type of beam construction for cable-tool operation, the unit being convertible from cable-tool to rotary operation, also will be shown.

Other items of equipment to be displayed are the Shaffer rotary hose coupling and flexible ball joints for rotary hose.

Representatives: G. W. Shaffer, secretary and manager; B. F. Kelley, vice-president and sales manager; and J. H. Keyes, designing engineer.

●

SHAFFER TOOL WORKS
Brea, California

Booths Nos. 1 and 2 Oklahoma Building

EXHIBIT: Following is a brief description of the equipment to be displayed:

1. Type 38 Shaffer cellar control gate in a new design, but employing the basic principles of the Shaffer Sealing Method.
2. Type 38 Shaffer rotating blowout preventer consisting of a rotating packing member that is self-sealing while drilling, running, or pulling pipe.
3. Shaffer improved flow beans of various designs.
5. Shaffer liner hanger.

Representatives: W. D. Shaffer, John H. Moran, Charles Geddes, and C. W. Vogt.

●

THE SHERWIN-WILLIAMS COMPANY
Cleveland, Ohio

Booth No. 55 Oklahoma Building

EXHIBIT: Display will consist of rust inhibitive primers and weather resistant finishing coats for oil-field equipment and the petroleum industry in general. Synthetic type finishes also will be displayed.

Representatives: K. H. Wood and W. J. Montgomery, of Cleveland, Ohio; W. P. Clark, of Kansas City, Missouri; and E. J. Gebhart, of Tulsa, Oklahoma.

●

SINCLAIR PRAIRIE OIL COMPANY
Tulsa, Oklahoma

Booths Nos. 99, 100, 111, and 112 Texas Building

●

SIVYER STEEL CASTING COMPANY
Milwaukee, Wisconsin

Booth No. 48 Kansas Building

EXHIBIT: Will display samples of refinery furnace fittings such as return bends.

Representatives: Ralph Burke, manager of Refinery Division, Milwaukee; W. V. C. Jackson, district sales manager, Tulsa, Oklahoma; and Walter S. Smith, Tulsa.

●

SKELLY OIL COMPANY
Tulsa, Oklahoma

Booths Nos. 46, 47, 58, and 59 Refiners and Marketers Building

EXHIBIT: This space will be devoted to products of Skelly Oil Company and its affiliated company, Skelgas Company.

●

SKF INDUSTRIES, INC.
Philadelphia, Pennsylvania

Booths Nos. 67 and 68 Texas Building

EXHIBIT: Display will consist of a complete line of ball and roller bearings and pillow blocks.

Representatives: R. C. Byler, R. H. DeMott, F. E. Ericson, G. Palmgren, H. L. Gaddis, A. H. Dixon, and W. F. Weidner.

●

A. O. SMITH CORPORATION
Milwaukee, Wisconsin

Booths Nos. 177, 178, 179, and 180 Oklahoma Building

EXHIBIT: To exhibit equipment used in the oil and gas industry. These products are: Smith pressure vessels, Smithlined vessels, Smith line pipe, Smith high-yield casing, and Smith meters.

Representatives: C. C. Joys, jr., vice-president; B. F. Bart, sales manager; A. E. Butts, district sales manager; Tom Creden, Tulsa district office; H. A. Bourne, Houston sales manager; Keith Camp and Curtis Meyer, Houston office; and J. Dilot, advertising manager.

●

E. M. SMITH COMPANY
Los Angeles, California

Booths Nos. 114 and 115 Kansas Building

EXHIBIT: The following of the "Grizzly" line will be featured:

Grizzley full-moulded rotary brake blocks for all types of brakes and drum diameters. In this connection, the Grizzly Brake Block Band Exchange will be explained in detail by attendants at the show.

The Grizzly Giant Streamline Drill Pipe Protector with its solid one-piece body of tough, resilient rubber, tapped into a vice-like grip on the pipe with a tapered locking key.

The steel-armored Grizzly Rotary Hose, combining flexibility with strength and toughness, made in three types: Grizzly Powerflex, tested to 10,000-lb. pressure; Grizzly Red Line Cub, tested to 7500 lb. pressure, and Grizzly Cub, tested to 5000-lb. pressure.

The Grizzly "No-Wip" Line Saver, produced for the purpose of eliminating needless expense and hazards attending excessive line wear.

Other items to be included are the Grizzly Flexible Discharge Unit; Grizzly Rotary Hose Couplings, and Grizzly Belting, Raw Edge, Transmission, Endless, and Conveyor types.

Representatives: Walter G. L. Smith, vice-president and general manager; Paul Kelting, in charge of the Houston, Texas, branch; and Ed Carter, in charge of Oklahoma City, Oklahoma, branch.

●

SMITH SEPARATOR CORPORATION
Tulsa, Oklahoma

Booths No. 88, 89, 90, 121, and 122 Texas Building

EXHIBIT: Smith Separator Corporation will exhibit jointly with the Fisher Governor Company. Equipment shown will be high-pressure, and standard oil and gas separators in operation, likely the latter operation in conjunction with a Smith Vacotrap. Also a combination separator, Vacotrap, and measuring chamber in operation.

Representatives: R. S. McKeever, president; E. H. Ross, R. S. Stover, Lenard Haughton, J. H. Smyth, and Chas. D. Peterson.

●

THE SONNER BURNER COMPANY, INC.
Winfield, Kansas

Booth No. 58 Oklahoma Building
Block R (outside)

EXHIBIT: Sonner Standard air-cooled natural gas burner for use in oil field boilers will be shown, as well as Sonner Super air-cooled natural gas burner for use in oil field boilers, Sonner Super air-cooled butane gas burner for use in oil field boilers, and Sonner gas burners for domestic use.

Representatives: P. J. Sonner, R. L. McCall, K. D. Goodwin, Max V. Stocking, and S. A. Swoyer.

●

SPANG, CHALFANT, INC.
Pittsburgh, Pennsylvania

Booths Nos. 219, 220, 231, and 232 Oklahoma Building

EXHIBIT: Equipment to be exhibited will include the company's shrink thread drill pipe and extreme line casing.

Representatives: J. D. Hardcastle, vice president, Pittsburgh; L. L. Brundred, general manager of sales, Pittsburgh; R. M. Burk, manager of sales, St. Louis, Missouri; A. S. Weaver, manager of sales, Houston, Texas; O. A. Bergmann, Tulsa, Oklahoma; and H. G. Texter, Tulsa.

●

SPANG & COMPANY
Butler, Pennsylvania

Booths 44, 45, 60, and 61 California Building

EXHIBIT: Spang weldless jars, straight and twisted bits, rope sockets, hollow reamer, boxes and pins, Ekin drive head, multi-slip collar sockets, corrugated friction sockets, Spang grab, solid friction socket, full circle friction socket, trap slip socket, wire line knife, casing ripper, trip spear, various types of packers, and thread protectors.

Representatives: F. J. Spang, L. B. Spang, C. E. Spang, L. F. Porter, F. J. Riper, E. B. Irvan, and O. B. Pierce.

●

SPEEDER MACHINERY CORPORATION
Cedar Rapids, Iowa

Block P (outside)

●

SPERRY-SUN WELL SURVEYING COMPANY
Philadelphia, Pennsylvania

Booths Nos. 51 and 52 Scientific and Technical Building

EXHIBIT: Display will show the Syfo Clinograph, the H-K Inclinometer, the H-K Directional Magnetic Clinograph, both large and small, as well as the Surwel Gyroscopic Clinograph. Also will have on display several samples of cores that have been oriented by the company's new polarization method.

Representatives: G. L. Kothny, vice-president; M. T. Higgs, regional manager, or John P. Klep.

●

SQUARE D COMPANY
Milwaukee, Wisconsin

Booths Nos. 50 and 51 Refiners and Marketers Building

●

STANDARD ASBESTOS MANUFACTURING AND INSULATION COMPANY
Kansas City, Missouri

Booth No. 129 Kansas Building

●

THE STAR DRILLING MACHINE COMPANY
Akron, Ohio

Block Z (outside)

EXHIBIT: Will display two all-steel spudders with self-contained power unit and 100 percent anti-friction bearing equipment, incorporating some new ideas for absorbing drill shock. These spudders also have many highly desirable features developed by the company.

A line load recorder that has been in process of development for several years will be shown. This recorder shows graphically the load on the drilling line and the character of each tool stroke.

Representatives: M. A. Macbeath, vice-president and general manager; J. H. Nelson, sales manager; George Heinish, chief engineer; and I. E. Wild, representative for Oklahoma

●

ST. LOUIS CORDAGE MILLS
St. Louis, Missouri

Booth No. 123 Kansas Building

EXHIBIT: A representative stock of manila oil-field cordage will be on display.

Representatives: K. K. Kirlin and Harold V. Pate.

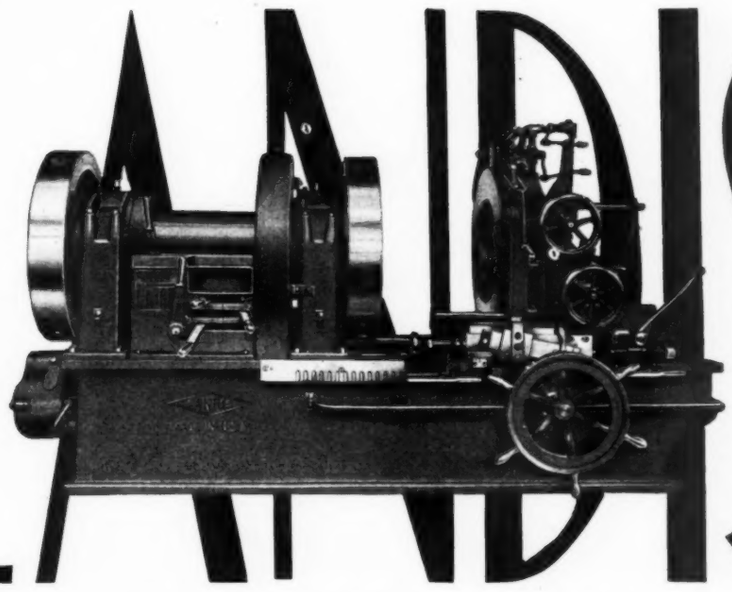
●

ST. LOUIS STEEL CASTING COMPANY
St. Louis, Missouri

Booths Nos. 35 and 36 California Building

Register immediately on entering Exposition grounds at THE PETROLEUM ENGINEER Building, registration headquarters, Drake Drive near 21st Street entrance.

See LANDIS



THREAD CUTTING EQUIPMENT

MODERN

The LANDMACO Threading Machine *and* **The LANDIS Receding Chaser Pipe Threading Machine**

both in actual operation

The LANDIS Receding Chaser Pipe Machine for cutting threads on casing, tubing, and drill-pipe will be threading Grade D Seamless. Examine the perfection of these threads which cannot be produced more economically or with greater accuracy.

The LANDMACO Threading Machine for bolts, rods, etc., will be in operation threading short rods. Investigate the production possibilities and other advantages of this precision thread cutting tool.

To see these superior tools is to know that LANDIS Thread Cutting Equipment is the solution to your threading problems. May we have the pleasure of your visit to our booth—

See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY, 14-21

INTERNATIONAL PETROLEUM EXPOSITION

Bring your threading problems along

Booths Numbers 6-7-8, Oklahoma Bldg.

LANDIS MACHINE COMPANY, Inc.

Waynesboro, Penna.

SULLIVAN MACHINERY COMPANY
Michigan City, Indiana

Block 7 (outside)

EXHIBIT: On display will be a scale model of the Sullivan pneumatic pump head, mounted in a derrick and complete with hanging equipment, catwalks, volume tanks, heater, and compressor. Also shown will be a Model 36 truck-mounted seismograph core drill.

Representatives: J. W. Haddock, vice-president; R. B. Thomas, advertising manager; J. B. Martin, head of the core drill department; J. A. Noyes, petroleum division manager; P. D. Cornelius, manager pump head department; H. H. Vanderzee, machine designer; Harry Johansen, chief engineer, core drill division; J. F. Kendrick, research engineer; G. E. Smedberg, salesman; H. H. Hollenshead, salesman; W. A. Krevis, salesman; J. M. Schultz, salesman; W. H. Wyneman, machine designer; C. L. Vandergriff, salesman; P. G. Sharp, salesman; and Wade Wineman, chief engineer, pump head division.

SUN OIL COMPANY
Philadelphia, Pennsylvania

Booths Nos. 52 and 53
Refiners and Marketers Building

SURFACE EQUIPMENT COMPANY, INC.
Tulsa, Oklahoma

Block A (outside)

EXHIBIT: Will display drop-forge Safety "C" and disconnecting links, drop-forge combination clamps, cast-steel friction clamps and disconnecting blocks, roller type hold-up and hold-down, roller type hook-off, the new Seco belt tightener and T Bar hook-offs, roller rod carriers, portable hexagon and welded cooling towers.

Representative: Wade H. James, Jr.

C. J. TAGLIABUE MANUFACTURING COMPANY
Brooklyn, New York

Booths Nos. 24 and 25
Scientific and Technical Building

EXHIBIT: C. J. Tagliabue Manufacturing Company, manufacturers of indicating, recording, and controlling instruments for temperature, pressure, level, flow, etc., will attractively display in a modern silver and blue setting the latest Tag instrument developments. A new super-speed Celectray recording pyrometer, designed to expose heretofore uncharted, but vital, temperature changes, will be operating in the Tag display showing an oil refinery. Each time the instrument records a temperature, a colored light will flash on a large photograph, at the point where the temperature is taken, dramatically demonstrating how six different accurate temperature records can be made in a period of 30 seconds.

Another new Celectray pyrometer of the indicating type will be shown for the first time. It was developed to meet the need for an economical means of obtaining throttling control of electric furnaces. This instrument employs the Celectray principle of photoelectric detection of the position of a beam of light reflected from a mirror galvanometer toward a reciprocating control edge. It has no dead zone and holds a steady temperature without oscillation.

"From Raw Material to Finished Product" is another of the interesting features that will be prominently displayed in the Tag booth. Here will be found every step in the making of Tag laboratory thermometers and hydrometers from the cane glass to a complete variety of finished instruments.

In addition, a new line of pressure spring instruments having many advanced mechanical features of construction will be introduced to the oil industry. Besides their mechanical excellence, the new and pleasingly proportioned rectangular case will give a modern touch to the instrument panel board.

There will be a new and unusual Tag float-type throttling level controller, a complete line of Tag oil testing instruments, Tag magnetic clutch flow instruments, and Tag industrial thermometers.

Representatives: E. D. Wacker, general sales manager; A. G. Koenig, district manager; and L. Van Blerkom, division sales manager.

TAYLOR INSTRUMENT COMPANIES
Rochester, New York

Booths Nos. 32, 33, and 34
Scientific and Technical Building

EXHIBIT: On display will be a complete line of Taylor temperature, pressure, flow, and liquid level instruments, including Fulscope indicating and recording controllers, Motosteel Valve and Vavl-Precisor, Dubl-Response control unit, Binoc tubing industrial thermometers, Permax hydrometer, flow meters, and liquid level recorders. The featured instrument in the Taylor display will be the Taylor Fulscope Micromax Controller.

Representatives: A. J. Fleig, divisional sales manager petroleum industry; R. E. Clarridge, sales engineer, Rochester; E. H. Triphaus, southwestern regional manager; L. G. Marsh, Tulsa sales office; D. J. Condit, Tulsa sales office; and H. A. Brown, St. Louis sales office.

TEMPLETON, KENLY AND COMPANY
Chicago, Illinois

Booths Nos. 42 and 43 **Texas Building**

EXHIBIT: Will have on display the Simplex line of jacks for oil-field service, including the new Simplex double chain pull rod jacks, the new Simplex multi-ball bearing journal jacks, etc.

Representatives: J. B. Templeton, vice-president; Charles Neher, district manager.

THE TEXAS COMPANY
New York, New York

Booths Nos. 31 and 32
Refiners and Marketers Building

EXHIBIT: Display will feature finished Texaco products.

Representative: J. W. Wallace.

TEXASTEEL MANUFACTURING COMPANY
Fort Worth, Texas

Booth No. 132 **Kansas Building**

EXHIBIT: The exhibit will feature a study of sucker rod problems, including design, manufacturing processes, and the metallurgical studies involved. In addition to sucker rods the company manufactures pull rods, pumping units, jacks, tubular goods products, swings, and other surface pumping equipment. The exhibit also will include examples of electric steel castings for oil country equipment cast in the foundry of Texas Steel Company, parent organization of Texasteel Manufacturing Company.

Representatives: A. J. Armstrong, vice-president and general manager; George W. Armstrong, Jr., director; J. W. Emery, vice-president in charge of sales; George I. Calvert, metallurgist; and Floyd L. Swindell, engineer.

THERMOID RUBBER COMPANY
Trenton, New Jersey

See Oil Well Supply Company Exhibit.

THOMPSON PUMP COMPANY
Okmulgee, Oklahoma

Booth No. 48 **California Building**

EXHIBIT: Will have on display working models of the company's combination cup and plunger, all-metal pumps, and sand-proof pumps.

Representatives: R. D. Thompson and Frank Wilcom, Okmulgee, Oklahoma, and the following field men: L. R. Herman, Seminole, Oklahoma; Vaughn Twibell, Oklahoma City, Oklahoma; Robert S. Holmes, El Dorado, Arkansas; and H. A. Littlejohn, Fittstown, Oklahoma.

THORNHILL-CRAVER COMPANY
Houston, Texas

Booths Nos. 86 and 87 **Kansas Building**

EXHIBIT: The following equipment will be on display:

1. Unibolt couplings: a. Malleable iron—low pressure; b. Forged steel—high pressure; c. Cast steel—"Big Inch" for pump suctions.
2. Unibolt flexible ball joints.
3. Unibolt tees and crosses for use on Christmas trees, high pressure.
4. Unibolt flow bean, positive or adjustable.
5. Unibolt return bends for refineries.

Representatives: H. E. Thornhill, C. W. Thornhill, Kenneth Craver, R. S. Warren, and T. W. Walker.

THE TIMKEN ROLLER BEARING COMPANY
Canton, Ohio

Booths Nos. 72 and 73 **Texas Building**
Booths Nos. 10, 11, and 12
Refiners and Marketers Building

EXHIBIT: The company will have two displays, one devoted to tapered roller bearings and the other to the steels produced by its Steel and Tube Division. Typical oil-field bearing applications will be shown on illuminated panels and these in turn will be tied into actual bearings such as are used in the operating equipment so that the user of the equipment can see how sturdy the bearings are and how easily they operate as well as where and how they are used. Supplementing this display will be special literature describing the use of Timken bearings in oil-field equipment. The bearing display will be in Booths Nos. 72 and 73, Texas Building.

Samples of the various types of steel and seamless tubing used in oil production and refining will be on display in Booths Nos. 10, 11, and 12, Refiners and Marketers Building, together with literature describing the properties of the various steels as related to the problems encountered in refining. Specialists will be on hand at all times to discuss high temperature and other steel problems.

Representatives: From the bearing company: W. B. Moore, general sales manager; S. M. Weckstein, chief engineer, Industrial Division; H. W. Trump, manager Dallas, Texas, district; S. T. Salvage, Houston, Texas; W. F. Anderson, manager, St. Louis, Missouri; H. D. Robb, manager, Pittsburgh, Pennsylvania; and P. J. Reeves, manager, San Francisco, California. Representing the Steel and Tube Division of the company will be: H. H. Timken, jr., vice-president; S. D. Williams, director of sales; D. T. Marvel, manager, tube sales; W. E. Taggert, assistant manager tube sales; Martin Fleischmann, metallurgical engineer; and C. H. McCollam, chief chemist.

TNEMEC COMPANY, INC.
Kansas City, Missouri

Booth No. 85
Scientific and Technical Building

EXHIBIT: Will exhibit tests from the field with supporting data illustrating how Tnemec specifications combat corrosion on interior of all storage tanks handling sour crude and salt water; illustrating prevention of corrosion on underground pipe lines; durability of Tnemec coatings on gal-

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

vanized iron; in fact, illustrating economical maintenance for all types of oil-field equipment.

Representatives: J. B. Ray, vice-president; F. L. Sweet, district manager, South Texas and Louisiana; A. J. Hunt, district manager, West Texas and New Mexico; Jack Green, district manager, Kansas and Oklahoma; J. E. Davis, district manager, North Texas and Arkansas.

THE TOLEDO PIPE THREADING MACHINE COMPANY
Toledo, Ohio

Booths Nos. 112 and 113 Kansas Building

EXHIBIT: Will have on display: "Toledo" hand-operated pipe-threading and cutting tools, pipe reamers, and power pipe machines. Will show the "Toledo" No. 999 Super-Model, small portable power pipe machine, and the "Toledo" No. 1-2-4 high-speed 4-in. machine.

Representatives: W. R. Vosper, C. A. Wagner, E. H. Recker, and R. W. Warnke.

TRACKSON COMPANY
Milwaukee, Wisconsin

Block V (outside)

EXHIBIT: Trackson pipe layers, anglefillers, and backfillers will be on display. Trackson pipe layers on "Caterpillar" track-type tractors are new and have never been shown before at the International Petroleum Exposition. The same is also true of the company's anglefillers and backfillers.

Representatives: W. H. Stiemke, general manager; L. E. Dauer, sales manager; I. W. Kunert, L. M. Clark, L. C. Frank, and N. M. Erdahl.

TRETOLITE CORPORATION, INC.
Webster Groves, Missouri

Booths Nos. 69 and 70
Scientific and Technical Building

EXHIBIT: Tret-O-Lite for treating and conditioning crude oil will be on display.

Representatives: Booths will be in charge of Gordon S. Nees, associated with M. J. Mullally, under the direction of Kenneth R. Farr. Other representatives in attendance will be J. S. Lehmann, Frederic Penn, F. L. Kelley, C. G. McCaleb, O. F. Dunafon, Howard Land, L. C. Camblin, Joe Keevil, C. G. James, J. L. Keel, Ira S. Boydstun, R. A. Waters, W. N. Thurston, F. E. Love, Walter Curran, A. D. Watson, C. W. Fornes, R. F. Scivally, Almond Gates, Mont Land, and C. C. Rogers.

TRIMONT MANUFACTURING COMPANY
Roxbury, Massachusetts

Booth No. 115 Oklahoma Building

EXHIBIT: Full line of Trimont wrenches.

Representative: J. F. Corcoran.

TRINITY PORTLAND CEMENT COMPANY
Dallas, Texas

Booths Nos. 124 and 125 Kansas Building

EXHIBIT: For production men, Trinity will show their complete line of oil-well cements covering all requirements from shallow production to the deepest, where bottom-hole temperatures are well over 200 deg. fahr. and pressures are extreme. There will be petroleum engineers and cement technicians in attendance at all times to discuss oil-well cementing requirements, particularly in connection with unusual and difficult jobs.

Of interest to everyone will be a complete working model of a deep-well drilling rig. It is on an inch to the foot scale and includes practical steam boilers, engines, pumps, drawworks, electric light generator, kelly, string of drill pipe, slush pumps, etc., with a 122 ft. (10 ft. 2 in.) derrick. This rig is used to demonstrate a model deep-well cementing job with a practical cementing truck built to the same scale as the rig.

Representatives: Cedric Willson, petroleum research engineer; Jack Barnes, petroleum engineer; and Harry J. Seesums, petroleum engineer.

TUBE-TURNS, INC.
Louisville, Kentucky

Booth No. 132 Texas Building

EXHIBIT: Will display a complete line of Tube-Turns and Tube-Turn tees, reducers, heads, Van Stone and Shaped Nipples and forged-steel flanges.

TULSA RUBBER PRODUCTS COMPANY
Tulsa, Oklahoma

Booths Nos. 226 and 227
Oklahoma Building

EXHIBIT: A general line of mechanical rubber goods will be on display.

Representative: E. T. Rohrkaste.

TWIN DISC CLUTCH COMPANY
Racine, Wisconsin

Booths Nos. 252 and 253
Oklahoma Building

EXHIBIT: Several sizes of power take-off units especially designed for oil-field pumping service and heavy-duty work, such as mud pumps, etc., will be displayed. Also on display will be the Model E clutches, used in rotary drawworks and reverse clutches. In addition, a stub shaft mounted E clutch, used on drilling engines in the oil fields, will be shown, as well as a miscellaneous display of smaller clutches used in auxiliary units. An assortment of standard power take-offs also will be included in the exhibit, these being used in the oil fields on collector pumps, etc.

Representatives: G. M. Guilbert, vice-president and sales manager; J. B. Jenkins, district manager in the Oklahoma territory; R. H. Smith, district manager in the Ohio territory; and E. C. Billings, assistant sales manager.

TYSON ROLLER BEARING CORPORATION
Massillon, Ohio

Booth No. 26 California Building

EXHIBIT: Display will consist of various sizes of Tyson cageless tapered roller bearings used in equipment manufactured for the oil fields. The cageless feature permits a full complement of tapered rolls that develop about 30 percent more capacity, rigidity, and longer life than is obtainable with the same size cage-type bearing, according to the manufacturer.

Representatives: George C. McMullen, vice-president in charge of sales; and H. J. Deal, assistant sales manager.

tion. Representatives of manufacturers who

UNA WELDING, INC.
Cleveland, Ohio
Exhibiting with Frick-Reid Supply Corporation

EXHIBIT: Various types of Una welding electrodes and the Una automatic head.

Representative: R. A. Byrd, sales engineer.

UNION CARBIDE AND CARBON CORPORATION
New York, New York

Booths Nos. 6, 7, 8, and 9
California Building

EXHIBIT: The Linde Air Products Company, Haynes Stellite Company, and National Carbon Company, Inc., all units of Union Carbide and Carbon Corporation, will exhibit jointly. The Linde Air Products Company will feature multi-flame Lindewelding, the welding of oil-well casing, portable cutting machines for preparing pipe and plate, and other oxy-acetylene applications in the oil industry.

For Haynes Stellite Company will display alloys for resistance to abrasion and corrosion. The display will emphasize the wide variety of oil-field applications for the hard-setting and hard-facing materials—Haystellite Inserts, Haystellite Composite Rod, Tube Haystellite, Haynes Stellite welding rod, and Hascrome, Haystellite cast tungsten carbide products, for protecting the cutting and reaming edges of oil-well drilling bits, and the methods of using them to best advantage will be featured.

Hastelloy alloys, the nickel-base alloys for refinery equipment handling strong mineral acids, will also be shown. These alloys have been especially developed for resistance to the action of strong chemical reagents. Pump and valve parts, piping, and containers fabricated from these acid-resistant alloys will be on display.

THE UNION CHAIN AND MANUFACTURING COMPANY
Sandusky, Ohio

Booths Nos. 37 and 38 California Building

EXHIBIT: Union A. P. I. rotary chain, Union machine-finished roller chains and sprockets, Union-American high speed silent chain and sprockets, and Union silent chain flexible couplings will be shown.

Representatives: E. F. Emmons, Perry Catron, J. H. Drapier, W. R. Davis, and L. B. Holt.

UNION WIRE ROPE CORPORATION
Kansas City, Missouri

Booths Nos. 80, 81, 82, 129, 130, and 131 Texas Building

EXHIBIT: The exhibit will be the same as the company has had for the last two or three shows, namely the train exhibit, showing distribution of Union Wire Rope from the factory at Kansas City to oil fields, mining districts, and the lumber industries.

Representatives: M. G. Ensinger, president and general manager; R. H. Bartlett, chairman of the board; L. G. Schraub, vice-president and general sales manager; H. R. Gruber, vice-president and manager of oil country sales; J. H. Hatch, vice-president and treasurer; H. R. Cutlip, assistant manager of oil country sales; J. A. Underroofler, Tulsa and Bartlesville sales; L. P. Nixon, Oklahoma field sales representative.

UNITED AMERICAN BOSCH CORPORATION
Springfield, Massachusetts

Booths Nos. 62 and 63 California Building

UNITED SPECIALTIES COMPANY
Chicago, Illinois

EXHIBIT: Will not have an exhibit under company's own name; however, United oil bath air cleaners will be shown as standard equipment on a number of engines exhibited at the Exposition.

Representative: H. G. Chandler.

UNITED STATES STEEL CORPORATION
Pittsburgh, Pennsylvania

Booths Nos. 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, and 150 Oklahoma Building

EXHIBIT: Equipment to be shown includes: electrical wire, wire rope and cables, steel roofing and siding, stainless steel, alloy steel, property protection fence, and oil-well cement.

Companies to be represented in the

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United States Steel Corporation Subsidiary exhibit are:

American Steel and Wire Company.
Carnegie-Illinois Steel Corporation.
Columbia Steel Company.
Cyclone Fence Company.
Scully Steel Products Company.
Tennessee Coal, Iron and Railroad Company.
Universal Atlas Cement Company.

All are subsidiaries of the United States Steel Corporation.

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UNITED SUPPLY AND MANUFACTURING COMPANY
Tulsa, Oklahoma

Booths Nos. 107, 108,109, and 110 Kansas Building

EXHIBIT: Will display Tico engines and other equipment manufactured by Titusville Iron Works Company, A. Leschen and Son's wire rope products, Lovejoy couplings, New-Way engines and combinations of this engine with rotary pumps, pumping jacks, and generators.

Representatives: Chas. J. Halloran, vice-president; F. P. Thieman, P. W. Aular, and H. W. Denton.

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UNIT RIG AND REEL COMPANY
Tulsa, Oklahoma

EXHIBIT: Will display Unit Rig portable rotary drawworks; also three Unit rigs, one of Model U-10, and two of Model U-12.

Representatives: Wm. Guier, H. S. Chancey, and Ray Carter.

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UNIVERSAL ENGINEERING COMPANY, LTD.
Los Angeles, California

Booths Nos. 189 and 190 Oklahoma Building

EXHIBIT: Rotary oil-well drilling bits.

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THE VAPOR RECOVERY SYSTEMS COMPANY
Compton, California

Booths Nos. 80 and 81 Oklahoma Building

EXHIBIT: Equipment to be displayed consists of the following: Conservation vent valves, flame arresters, automatic tank gauges, swing line equipment for oil tanks, manheads for tanks, gauge and thief hole covers, and vapor-recovery regulators.

Representatives: Frank V. Long, Frank M. Holloway, H. O. Johanson, John McClain, T. E. Ward, and L. S. Curfew.

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VICTAULIC COMPANY OF AMERICA
New York, New York
See Hanlon-Waters, Inc., Exhibit

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VISCO PRODUCTS COMPANY, INC.
Houston, Texas

Booth No. 83 Kansas Building

EXHIBIT: Visco oil treating chemicals for the breaking and resolution of oil field emulsions will be displayed.

Representatives: Dr. W. H. Kirkpatrick, J. R. Moechel, and C. F. Spangler.

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VORTOX MANUFACTURING COMPANY
Claremont, California

Booths Nos. 3 and 256 Oklahoma Building

EXHIBIT: On display will be a number of Vortox air cleaners and the Vortox air cleaner groups that are used in the oil country. One of the large Vortox units, either 36 in. or 45 in. in diameter, will be shown.

Representatives: C. C. Sowerby, factory representative; James M. Judy, sales manager.

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WACKMAN WELDED WARE COMPANY
North Kansas City, Missouri

Booth No. 42 Refiners and Marketers Building

WALL ROPE WORKS, INC.
New York, New York

Booth No. 31 Texas Building

EXHIBIT: Partial list of items on display includes Wall manila cat lines, Wall drilling cable, Wall spinning lines, Wall bull ropes, Wall derrick lines, and various sizes of Wall plain laid rope.

Representatives: J. Lloyd Dittman, Tulsa, Oklahoma; G. C. Terry, Parkersburg, West Virginia; Jim England, Houston, Texas; and C. J. Kirkpatrick, Tulsa, Oklahoma.

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WALWORTH COMPANY
New York, New York

Booths Nos. 104, 105, 106, and 107 Oklahoma Building

EXHIBIT: Valves and fittings, representative of the complete line manufactured by Walworth for use in all divisions of the oil and gas industry, will be on display. One of the features of the display will be a 14-in., Series 300 Walworth steel gate valve, especially designed for refinery service where high-speed opening and closing is desired. This valve is motor-operated, and will be in operation at the Walworth booth during the Exposition.

Another "live" exhibit presented by Walworth will be a motor-operated 24-in., Class 500 Steeliron, ball-bearing, lubricated plug valve, venturi pattern, for high-pressure gas line service.

Drilling-gate and flow-line valves and fittings, lubricated plug valves, including the lubricated plug valve especially designed for Christmas tree and mud-line service, and items typical of the line of cast-steel gate and globe valves and fittings for hot-oil service in Series 150 to 1500, inclusive, should prove interesting to men from the producing and refining divisions of the oil industry.

For service on oil-country boilers, the newly-developed line of 350 W.S.P. bronze globe and check valves for feed-water service, and a complete line of 350 W.S.P. 750F globe, angle, check, and gate valves for steam-line service, will be displayed.

Walco, Walworth Genuine Stillson and Parmelee pipe wrenches for use in all branches of the industry, will also be exhibited.

Representatives: Howard Coonley, chairman of the Board, New York City; W. B. Holton, Jr., president, New York City; J. M. Olmsted, vice-president of sales, Los Angeles, California; F. W. Duemler, vice-president of sales, Dallas, Texas; F. H. Morehead, vice-president of engineering, New York City; W. M. Combs, manager Tulsa, Oklahoma, office; C. L. Bradbury, manager Dallas office; C. G. Finkle, manager Houston, Texas, office; E. L. Clark, manager field sales, Houston; H. C. Nannen, manager refinery sales, Houston; J. L. Rice, field sales, Odessa, Texas; E. B. Marrs, field sales, Wichita, Kansas; J. G. Younggren, field sales, Corpus Christi, Texas; P. B. Miller, field sales, San Antonio, Texas; and F. S. Markle, field sales, Houston.

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WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin

Block J (outside)

EXHIBIT: There will be on display a new 250-hp. 6-cylinder convertible gas and oil engine equipped with a new type of gasoline engine starter built into the drilling engine. There will also be on display an 80-hp. Comet-type Diesel truck engine in cut-away section; a 300-hp. convertible gas-oil Hesselman drilling engine; a 40-hp. Hesselman power unit; a 110-hp. gas or gasoline pumping unit operating on butane; a 150-hp. gas or gasoline pumping unit operating on butane; a 6-cylinder automatic power unit for pumping prorated wells—this unit automatically starts and stops at intervals to maintain good pumping conditions not possible where the pump is shut down for long periods.

Representatives: J. E. DeLong, president; J. B. Fisher, vice-president; J. G. Swain, general sales manager; A. F. Campbell, district manager (Tulsa); E. R. Rutenber, industrial engineer; Geo. Knipfel, oil field sales engineer; G. A. Duncan, oil field sales engineer; and P. C. Ritchie, advertising manager.

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WEBER ENGINE COMPANY
Kansas City, Missouri

Block H (outside)

EXHIBIT: Horizontal single-cylinder, 2-cycle, convertible gas engines; vertical one-cylinder, 2-cycle, gas engines; vertical two-cylinder and three-cylinder, 2-cycle Diesel convertible to gas engines; Weber Gold silencers; air-starting units.

Representatives: Arthur Clifford, sr., Arthur Clifford, jr., Jack Clifford, S. B. Gold, E. C. Noble, P. E. Parker, Ed Brooks, T. L. Chambers, and C. A. Snyder.

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THE WEBSTER ENGINEERING COMPANY
Tulsa, Oklahoma

Booths Nos. 22 and 23 Oklahoma Building

EXHIBIT: Will display the NGE-Nelson 1100 Series oilfield boiler burner; the NGE boilertrol; Webster "R" Series high-pressure register-type gas and oil burner; and the Webster VI Series high-pressure gas inspirator.

Representatives: L. S. Reagan, K. E. Graff, Geo. C. Bergtholdt, jr., and M. P. Ragan.

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WELL MACHINERY AND SUPPLY COMPANY, INC.
Fort Worth, Texas

Block 7 (outside)

EXHIBIT: Will have on exhibition and in operation a Jumbo "J" Fort Worth Spudder, a large portable spudding machine. It spools 11,500 ft. of ⅞-in. cable. It has been used for drilling wells to 5300 feet. The spudder will be equipped with a combination drilling and shear pole head and 56-ft. mast, sufficient for handling a regular standard string of tools and the longest joints of casing. These combination drilling and shear pole heads are fitted with three casing line sheaves for seven-line casing block hook-up, which is supported by not only the legs of the mast but by 6-in. drill pipe U-bolted to the mast legs. Fort Worth Spudders are made in ten sizes, the smallest being built for drilling to depths of 500 ft. and the largest having, as stated, a spooling capacity of 11,500 ft. of ⅞-in. drill cable.

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WESTCOTT AND GREIS, INC.
Tulsa, Oklahoma

Booths Nos. 65, 66, 67, and 68 Scientific and Technical Building

EXHIBIT: On display will be the following:

Flow meters, flow controls, proportional controls, small and large Ironcase positive displacement meters, as well as specialty

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gas-testing apparatus of the American Meter Company, Erie, Pennsylvania.

Type "E" Robinson orifice fitting of the Robinson Orifice Fitting Company, Los Angeles, California.

Back-pressure valves, liquid level controls and automatic control specialties of the Davis Regulator Company, Chicago, Illinois.

Gasoline meters, oil meters, water meters, featuring especially the new Well Flooder meter of the Buffalo Meter Company, Buffalo, New York.

Indicating gauges, pop safety valves, relief valves, gauge-testing apparatus, etc., of the Crosby Steam Gage and Valve Company, Boston, Massachusetts.

"U" manometers of all descriptions of The Meriam Company, Cleveland, Ohio.

A vacuum breaker valve for the maintaining of vacuum and the elimination of air when oil run tanks in the field are turned into the pipe lines.

Representatives: C. C. Clover, H. W. Wahl, B. E. Keeling, and R. A. Marsh of Westcott and Greis, Inc.; A. F. Benson of the American Meter Company; F. H. Breor and W. P. Hahn of the Crosby Steam Gage and Valve Company; Mr. Green of the Robinson Orifice Fitting Company; and R. A. Peterson of the Davis Regulator Company.

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WESTCOTT VALVE COMPANY
East St. Louis, Illinois

Exhibiting with Continental Supply Company

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THE WESTERN IRON AND FOUNDRY COMPANY
Wichita, Kansas

Booth No. 69 **Texas Building**

EXHIBIT: A friction-type pumping unit and steel front for pumping; possibly a steel derrick will be on display.

Representatives: D. A. Swenson, J. Q. Warren, and Sam Clawson.

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WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY
East Pittsburgh, Pennsylvania

Booths Nos. 91, 92, 93, 118, 119, and 120
Oklahoma Building

EXHIBIT: The display will include the company's products of particular interest to the petroleum industry. Included will be an oil-well pumping unit in operation, a dynograph mounted on a sucker rod to show stress measurements, socket-type instruments, a compact portable analyser for determining electrical load measurements, an oil-immersed controller, a turbine with cover removed to show internal design, and a cutaway motor to show its internal construction.

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WHEATLEY BROTHERS PUMP AND VALVE MANUFACTURING COMPANY
Tulsa, Oklahoma

Block M (outside)

EXHIBIT: The following will be shown: 4 by 6 pump having bronze fluid end, check valves, and combination valves.

Representatives: F. Wheatley, M. Hampton, and Dan O'Shea.

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THE WHELAND COMPANY
Chattanooga, Tennessee

Block R (outside)

EXHIBIT: The following equipment will be displayed: Wheland B-3200-A Drawworks will be shown connected to an Allis-Chalmers electric drive, and shown in operation. The B-3200-A drawworks is designed for drilling to depths of 10,000 feet. Four drum speeds and two rotary sprocket speeds are available.

Wheland-Lucey H-20,000 15½-in. by 8-in. by 20-in. inverted steam end duplex slush pump: Combined steam and exhaust valves situated below the steam cylinders. Exhaust steam must blow out condensate before leaving cylinder.

Wheland-Lucey A-18,000 triple oil bath rotary: Full length cast-steel base provides full protection when moving. Even tension on lower grease seal maintained by coil spring arrangement. Separate oil reservoirs for main load, gear, pinion and pinion shaft bearings.

Wheland E-6500-BA Oil Bath Swivel with spring loaded washpipe packing: Timken Tapered roller bearings, SKF ball bearings, American roller bearings. Designed for deepest wells.

Wheland B-7000 Reverse Clutch: For internal combustion engine-powered rotary drilling outfits. Dodge Diamond "D" friction clutch for forward rotation. Bevel gears with brake drum for reverse. Cut tooth steel gears and pinions.

Representatives: George Campbell, A. C. Willingham, and other company officials.

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THE WHITE MOTOR COMPANY
Kansas City, Missouri

Block G (outside)

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WHITLOCK CORDAGE COMPANY
Chicago, Illinois
Exhibiting with Frick-Reid Supply Corporation

EXHIBIT: Will display samples of the company's various products, including coils of rope.

Representative: E. W. Brown, western manager.

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THE WHITNEY CHAIN AND MANUFACTURING COMPANY
Hartford, Connecticut

Booths Nos. 74 and 75
Refiners and Marketers Building

EXHIBIT: Roller and silent chain drives for drawworks, hoists, winches, pumping units, etc., will be displayed.

Representatives: W. H. Whitney, vice-president; R. J. Howison, general field manager; and J. W. Anderson, Mid-Continent representative, Dallas, Texas.

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WICKWIRE SPENCER STEEL COMPANY
New York, New York

Booths Nos. 109 and 110
Oklahoma Building

EXHIBIT: Wickwire drilling lines will be on display.

Representatives: R. J. Jones, O. C. Elliott, E. J. Daly, D. J. Henecker, K. A. Zollner, and R. L. Foster.

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WICO ELECTRIC COMPANY
Springfield, Massachusetts

Booths Nos. 109 and 110 **Texas Building**

EXHIBIT: Display will consist of the EK and OC magnetos used in the oil fields. These are reciprocating type magnetos and have been used constantly for years. Will also exhibit complete line of rotary magnetos for oil-field application on pumping units, drilling rigs, auxiliary water-pumping equipment, welding equipment, compressor engines, portable engines, and booster compressor engines. This line will feature the heavy-duty and standard series AP magnetos equipped with needle bearings and circulating oil lubricating system for use on high-compression, heavy-duty engines. The Wico Series A, a light-weight, high-output magneto, for 1-, 2-, and 4-cylinder engines used as standard equipment on power units, also will be shown.

Representatives: Edward L. Stoughton, president; Harrison L. Hart, general sales manager; Victor K. Hunt, manager trade sales division; Leon F. Smith, southwest district manager; Joseph Jordan, sales representative; and Harry Lolley, manager parts department, Tulsa, Oklahoma.

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J. H. WILLIAMS AND COMPANY
Buffalo, New York

Booths Nos. 185 and 186
Oklahoma Building

EXHIBIT: The features of the exhibit will be the "Superector" and Tool Holder motion boards. These are animated boards showing in action the "Superector" reversible ratchet wrench for heavy-duty; similarly the Tool Holder board shows a Williams' turning tool apparently removing a heavy chip from a representation of a lathe in which the work is revolving in a lifelike manner.

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WILSON MANUFACTURING COMPANY
Wichita Falls, Texas

Block U (outside)

EXHIBIT: Will display the Wilson Atlas Model Portable Rotary Rig, Wilson Super Model Winch-Mobile, Wilson Double Drum Spudder, Wilson Utility Unit, and Wilson Senior Model Motor Winch.

Representatives: B. A. McCullah, B. L. Ligon, J. H. Wilson, and J. V. Wintle.

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WILSON WELDER AND METAL COMPANY
New York, New York

Booth No. 34 **Oklahoma Building**

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W-K-M COMPANY, INC.
Houston, Texas

Booths Nos. 203-210, inclusive
Nos. 241-248, inclusive **Oklahoma Building**

EXHIBIT: Equipment shown will be the following:

Gate valve. The W-K-M through-conduit lubricated gate valve has a smooth bore flow-way when opened with no gate cavities to collect sediment and to prevent proper closing. Seats are fully covered at all times and are not exposed to cutting or abrasion. Body and bonnet of the valve serve as a grease reservoir and contain sufficient grease to last one year or more. This grease provides easy operation of the valve and prevents internal corrosion.

Rotary slips. W-K-M rotary slips have friction face and are composed of several segments in a steel cage. The slips are flexible as the segments have both vertical and horizontal movement in the cage. The slips may be resharpened many times and segments can be removed or replaced on the derrick floor.

Tubing slips and spider. W-K-M tubing slips and spiders consist of two segments mounted in a forged-steel handle. These segments have full play in all directions to enable them to conform to the pipe and also to seat themselves in the spider. Only one man is required to handle.

Hauser round kelly drive. The W-K-M Hauser round kelly drive enables the operator to drill-in under pressure and also

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to drill-in with oil. Drilling-in is accomplished by using a joint of tubing or drill pipe as a kelly, which is rotated by flexible self-adjusting roller racks. These racks provide a positive drive for rotation, yet are "free wheeling" in upward or downward direction.

Mud screen. W-K-M mud screen requires no steam turbine or electric motor for operation. Screening is accomplished by the large rotary screening drum, which is driven by the flow of mud returns from the well. Cuttings and shale particles are separated and fed out the front of the machine while the clean mud is delivered from chutes at either side.

Merco Centrifugal Separator. The Merco Centrifugal Separator is primarily for desanding drilling mud and has a settling force equal to 166 times that of gravity. The mud enters the machine and by centrifugal action is cleaned of 90 percent of the drilling sand down to and including 200 mesh. It is also used for recovering mud weight material from the drilling mud.

W-K-M Wells slush pump piston. This piston has a steel core by means of which the piston can readily be converted from one size to another by changing the rubber sleeves. Steel parts are made of heat-treated, high-grade steel. Steel insert ring is vulcanized in the rubber sleeve to absorb the shock and prevent weaving and distortion of the rubber. Because of the convertible feature, piston expense is materially reduced when rubbers wear out or when liners are reduced from one size to another.

Brake band exchange service. W-K-M is prepared to supply replacement brake bands identical to factory equipment. For quick relining jobs on the derrick floor the old bands are removed and returned to the factory and it is, therefore, not necessary to shut down while the customer's old bands are being relined.

Twin-seat pump valves. The outstanding feature of twin-seat valves is the fact that the seat is composed of three parts—a bronze body, a steel insert, and a rubber insert. The bronze body is installed in the pump deck and remains there, which eliminates frequent pulling and resulting distortion or enlarging of the pump deck. As wear occurs the rubber and steel inserts are pulled from this bronze body and replaced.

Cosco well bore cleaner and casing centralizer. The Cosco centralizer accomplishes several different things merely by running it in the well. On the downward travel it trowels and smooths out the wall. For cleaning the mud from the face of the producing formation the tool is pulled upward and the top edge of the spiral springs scrapes away this mud. When on bottom this tool forms the casing in the hole as some part of the spiral springs contacts the entire circumference of the well. The spiral twist to the springs also serves to give a whirling motion to the cement and provide better penetration.

Sucker rod hangers. W-K-M sucker rod hangers consist of flexible steel chains equipped with heat-treated clamps. This hanger is placed in the derrick and avoids the necessity of laying down the rods that so frequently cause them to become kinked or dirty. The hanger is portable. Where desired, a steel container tub is provided in which the hanger may be placed and covered with oil to prevent rust.

Adjustable bottom-hole choke. W-K-M's new adjustable bottom-hole choke is placed in the bottom of the well and adjusted from the surface. This adjustment is accomplished by means of rotation of the tubing with a spiral gear. Choking at the bottom avoids freezing of surface connections and also places the control where it is most effective. Choking at the bottom also accomplishes a material reduction in the oil-gas ratio, it is stated.

Representatives: L. O. Koen, H. B. Cookston, E. L. MacBlain, W. C. Morgan, and C. A. Morgan.

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THE WOOD SHOVEL AND TOOL COMPANY
Piqua, Ohio

Booth No. 1 **Texas Drive**

Also exhibiting with Frick-Reid Supply Corp.

EXHIBIT: Will have an exhibit of various types of hand shovels, spades, and scoops in the Frick-Reid Supply Corporation building. As a special new feature will display the company's new line of aluminum alloy shovels and scoops, which are non-sparking. In addition a machine used for testing the abrasive wear of shovels will be shown in Booth No. 1, Texas Drive.

Representatives: E. T. Nipher, plant superintendent; Dan M. Bell; and W. H. Torian.

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WORTHINGTON MACHINERY CORPORATION
Harrison, New Jersey

Block L (outside)

EXHIBIT: On display will be the following:

A 180 hp., LPE-4 vertical, 4-cylinder, enclosed-type gas engine power unit direct connected to a 120-kw. a-c. generator with direct-connected exciter.

A 5 by 10 enclosed-frame, side-pot, fluid-end, Type KMS, heavy-duty piston-type power pump, mounted on structural-steel skids and driven by a 100-hp. Hercules 6-cylinder enclosed power engine.

A 4½ by 10 enclosed-frame, side-pot power pump mounted on structural-steel skids and driven by a 50 hp. electric motor.

A Worthington 4-GR, 250-gal.-per-min., 200-lb. pressure rotary pump driven by a Hercules 6-cylinder gas engine.

Worthington close-clearance HiVol simplex, direct-acting steam pumps.

Two 100-hp. Moore steam turbines direct connected to Worthington centrifugal pumps.

A 10 by 4½ by 10 horizontal duplex, Type PH, oil-well cementing pump.

Representatives: From Worthington Pump and Machinery Corporation: D. K. Chadbourne, vice-president; W. L. Russell, manager oil and gas engine department; Paul Diserens, consulting engineer; and R. C. Matthewson, assistant chief engineer. From Moore Steam Turbine Corporation: George R. Probst, sales manager; and Carl McDonald, chief engineer. From Worthington Machinery Corporation of Oklahoma: H. D. Cornell, president; F. W. Dye, secretary and treasurer; and J. A. Lupfer, vice-president and general manager.

o

YOUNG ENGINE CORPORATION
Canton, Ohio

Block A (outside)

EXHIBIT: Will show Young drilling engines in natural gas and Diesel type as used for cable-tool and rotary drilling. In connection with this will have the universal jackshaft for rotary drilling operated with the company's drilling engines. Also will show the company's electric light plants, which are used to supply light for the drilling rigs.

Representatives: Messrs. Young, Avers, Foster, Lemon, and Iverson.

o

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Youngstown, Ohio

Exhibiting with Continental Supply Company.

o

THE YOUNGSTOWN STEEL PRODUCTS COMPANY
Youngstown, Ohio

Exhibiting with Continental Supply Company.

o

JOHN ZINK COMPANY
Tulsa, Oklahoma

Block M (outside)

EXHIBIT: The following equipment will be shown: horizontal Bi-Mix burners for refinery stills and boilers; vertical Bi-Mix gas burners for oil-country type boilers; register-type combination gas and oil burners for stills and boilers; conversion burners for domestic furnaces; oil burners for refinery use; and refractory gas burners for small power and heating boilers.

Representatives: John Zink, Walter J. Combs, R. D. Reed, S. S. Smith, and E. R. McCarthy.

Received Too Late to Insert in Proper Alphabetical Position

o

WARNER LEWIS COMPANY
Tulsa, Oklahoma

Booths Nos. 5, 6, 7, 8, and 9
Refiners and Marketers Building

EXHIBIT: Will exhibit products of the following companies whom they represent in the Mid-Continent: National Pump Company, Morrison Brothers, Viking Pump Company, and the Ralph N. Brodie Company, Inc.

Representatives: Warner Lewis; J. J. Kropp, Dallas, George B. Richards, Tulsa, Dean S. Johnson, Oakland, G. F. Burnett, Chicago, and Walter Brown, New York, of Ralph N. Brodie Company, Inc.; W. E. Bakewell, chief engineer, Viking Pump Company; W. W. Dauner, Morrison Brothers; A. S. Jarecki, National Pump Company; and A. S. Culmore, Jr., Cincinnati Advertising Products Company.

o

LAMINATED SHIM COMPANY
Long Island City, New York

Booth No. 67 **California Building**

EXHIBIT: Will exhibit jointly with its manfacturers' representatives, the Industrial Sales and Engineering Company, Houston, Texas.

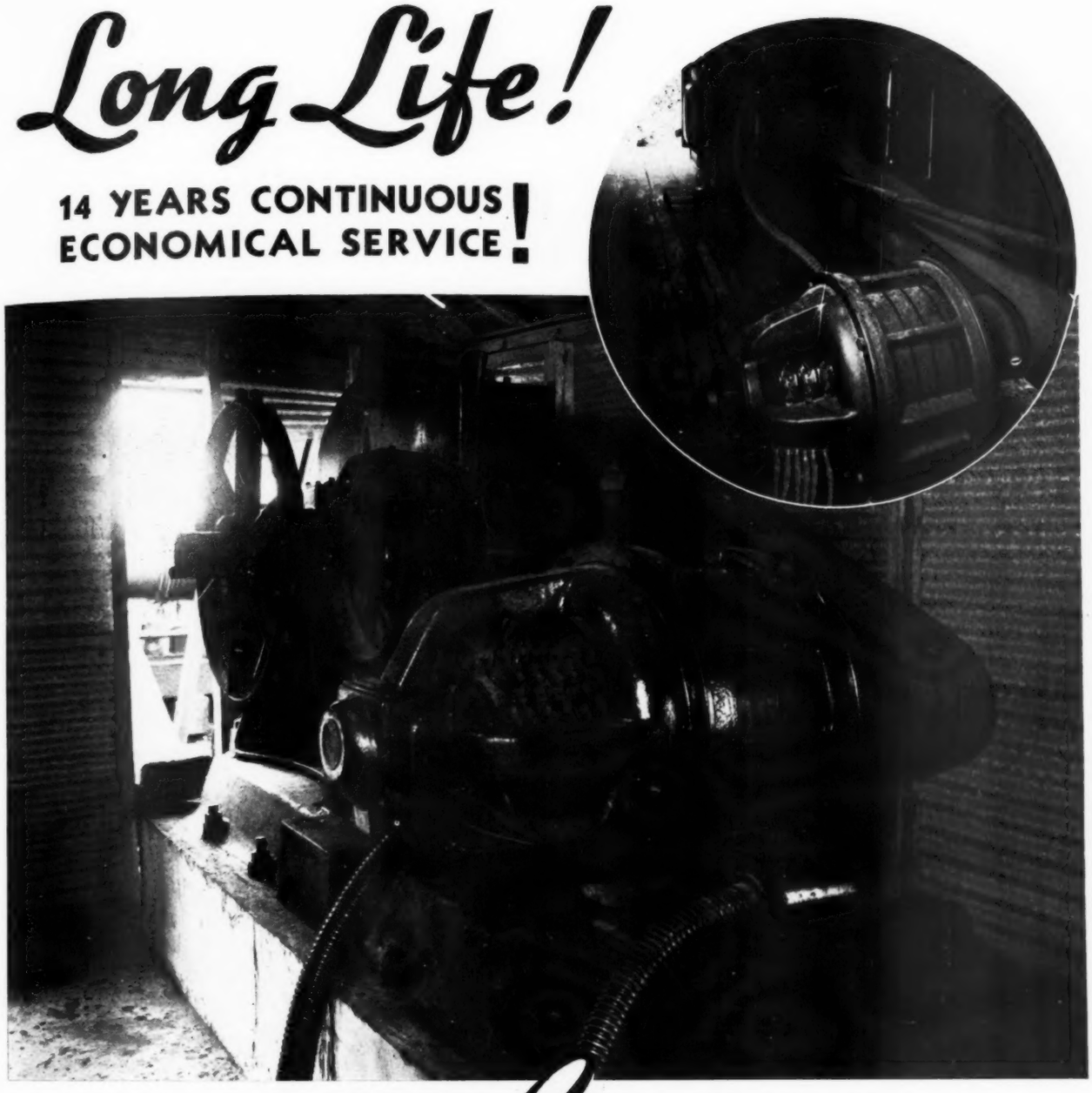
The Laminated Shim Company exhibit will illustrate the uses of Laminum shim stock, the solid brass shim stock that peels for accurate adjustment. Another item on display will be the company's handy dispensing kit, carrying an assortment of plain shim stock for convenient use in tool rooms, repair departments — anywhere on the job where shim brass and steel of accurate, known gauge are necessary.

Representatives: J. H. Drapier, W. R. Davis, L. B. Holt, and Owen C. Jones.

Immediately you enter Exposition grounds register at THE PETROLEUM ENGINEER Building on Drake Drive near Twenty-first Street entrance.

Long Life!

14 YEARS CONTINUOUS ECONOMICAL SERVICE!



REPLACED BY A MODERN PUMPING UNIT, *And Again It's*

PURCHASED *Electric* POWER

Pictured above are "two generations" of PURCHASED ELECTRIC POWER: Showing (inset) the pumping unit that was installed in 1924 at Goose Creek, Texas, and the modern pumping unit that recently replaced "old faithful" after 14 years of continuous service.

LAUGH WITH BARNEY

Edited by BARNEY HORRIGAN

Guide: Now we shall see the sarcophagus of King Tut.

Bashful Young Girl: I'd better wait here.

* * *

One day little Audrey locked the bath room door and threw away the key and then laughed and laughed because she knew her father was going to have a beer party that night.

* * *

An aged couple entered a hotel to make reservations for a room.

Clerk: Sorry, folks, but all I have left is the bridal suite.

Old Man: What the heck do I want with the bridal suite, we've been married 45 years.

Clerk: Well, if I gave you the ball room you wouldn't have to dance would you?

* * *

It was a good many years ago that Deacon Carson took his wife to the races. Just as the horses were lining up at the barrier, Mrs. Carson grasped the Deacon nervously bv the arm, and in a voice that was filled with emotion asked him for a safety pin, meanwhile grabbing frantically after something that seem to be slipping around the knees.

Just then someone nearby shouted, "They're off," and Mrs. Carson fainted.

* * *

The Irishman had been describing his travels in the far West and the virgin forests there.

"What is a virgin forest?" asked one of his listeners.

"Phwat is a virgin forest is it ye want to know? A virgin forest, sorr, is one phwere the hand o' man has niver set foot!"

* * *

Two old ladies were visiting a nudist camp. Strolling down an alley in the shrubbery, peering about for the expected shock, they espied two maidens. They gasped and looked a minute and then one of them exclaimed. "My! isn't that Fanny Brown?"

* * *

"Was she pleased when you gave her that lovely undie for her birthday?"

"Yes, but she cried a little."

"She did?"

"Yes, she said it was her first slip."

Sew It Seams

He married the dressmaker's daughter,
Many years ago;
But he can't get along with her mother
For she's an old sew and sew.

* * *

This young lady who worked all the time in a department chain store was asked by a friend why she insisted on working so hard all the time. The reply was that;- "I've been struggling for a long time to get myself a new fur coat."

"Well how did you get that one you have on?"

"Oh! I quit struggling."

* * *

Mother: So, son, you are going to marry a chorus girl. Is she the kind of girl you can bring home and introduce to your mother and sisters?

Son: Sure mom, but I'd hate to trust her with the old man.

The Horse and Mule live thirty years
And nothing know of Wine and Beers:

The Goat and Sheep at twenty die
And never taste of Scotch or Rye:

The Cow drinks water by the ton
And at eighteen is mostly done:

The Dog at fifteen cashes in
Without the aid of Rum or Gin:

The Cat in milk and water soaks
And then in twelve short years it croaks.

The modest, sober, bone-dry Hen
Lays eggs for nogs, then dies at ten.

All lower animals are curst
Because they lack a liquor thirst:

All animals are strictly dry;
They sinless live and swiftly die:

But sinful, ginful, rum-soaked men
Survive for three-score years and ten.

"The 'cullud' lady gave her name, her address, and her age; and then the clerk of registration asked this question:"

"What party are you affiliated with?"

"Does I have to answer that?"

"That is the law."

"Den you just scratch my name offen de books. Ef I got to tell dat party's name, Ah don't vote, dat's all. Why, he ain't got his divorce yet."

* * *

Hix: We have a fire department in our town that has only one hose cart and two dogs.

Lou: What are the dogs for?

Hix: To find the hydrants.

* * *

The other day we heard of the man who one morning slipped on his wife's kimono to answer the door bell, and when he opened the door the milkman kissed him. The only way he can account for this unusual occurrence is that the milkman's wife must have had one just like it.

* * *

Petunia Jackson remarked, when shown her new-born infant, "he looks jess lak his pappy, if ah remembahs right."

* * *

Two old women were having a heart-to-heart chat.

One said to the other—"So you're troubled with constipation too, are you? What do you take?"

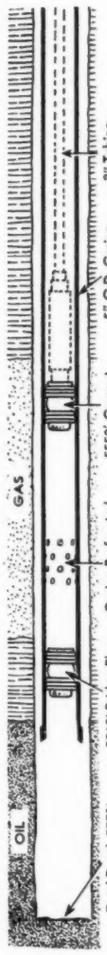
"Oh, well," answered the other, "I just takes me knitting."

* * *

The Zipper Peril

All these latest fads in clothing may be all right, but they don't suit everybody, as evidences the following yarn told me this week by one of the county's clothing merchants. A townsman's wife came in and was looking at a pair of new trousers for her husband. The merchant obligingly placed a number of pairs on the counter for inspection, with the remark, "Now, ma'am, here is a nifty pair of pants. They are equipped with a zipper and will eliminate the trouble of sewing on buttons." But quick as a flash, the lady replied: "No, sir, I don't want my husband to wear zipper pants. Just last month he bought a zipper sweater, and every now and then he tears off about half a necktie."

BY REDUCING THE GAS/OIL RATIO IN YOUR OIL WELL THROUGH THE APPLICATION OF A CEMENT SQUEEZE JOB



A typical Cement Squeeze Job (done with a Baker Cement Retainer) to effect reduction of gas/oil ratios.

A Tomball Job

The gas-oil ratio in [illegible] 1, Tomball, Texas, producer, has been reduced from 58,000:1 to 400:1 by an effective squeeze cementing job that shut off the upper gas stratum without damage to the main body of the oil zone. This well was completed originally at 5573 feet, and the 5-inch casing had been cemented at 5565 feet. The indicated bottom-hole temperature was 163° F. The gas-oil ratio was so high that a reduction was required to prevent the production of the gas allowable far ahead of the oil allowable. The Tomball field produces from a very thin and gassy formation, and the high gas-oil ratio has reduced the production of oil in many wells.

A bridge plug was set at 5562 feet, the casing perforated from 5556 to 5553 feet, and a cement retainer set at 5550 feet. The perforations were placed as nearly as possible opposite the offending gas stratum. A small amount of fresh water was pumped into the formation ahead of the cement, the initial pressure having been 2000 pounds and the final pressure 1500 pounds. Seventy-five sacks of cement were mixed and squeeezd through the perforations, the initial pressure having been 1500 pounds and the final pressure 2200 pounds.

The cement, retainer and bridge plug were drilled out, and the well brought back on production with a potential flow of 176 barrels of oil through a quarter-inch choke. The gas-oil ratio was only 400:1, a radical reduction from the original ratio of 58,000:1. A cement retainer was used as a bridge plug.

In this well the cement set readily in the gas sand, but did not affect the oil zone. Although the cement was directed primarily toward the offending gas formation, no special effort was made to confine it to a very small area near the perforations. Any cement that contacted the oil stratum apparently did not set in that part of the formation.

High gas-oil ratios in the Tomball field have given trouble since the first wells were completed, and operators have made various efforts to reduce the flow of gas. In many wells the maximum quantity of gas is produced long before the oil allowable is obtained. It is obvious that the satisfactory reduction of gas-oil ratios will permit production of full oil allowables in wells that now produce more than 2000 cubic feet of gas per barrel of oil.

Excerpt of article in the Oil Weekly of November 8, 1937 by Associate Editor, Brad Mills.

HERE'S HOW A SQUEEZE JOB (DONE WITH A BAKER CEMENT RETAINER) GIVES YOU A BIGGER SLICE OF THE PIE . . .

Excessive gas/oil ratios present an important problem in many fields. For example, in certain Mid-Texas fields, the maximum gas/oil ratio (governed by State law) is such that operators have been forced to tolerate a limited production of oil in order to meet the gas/oil ratio requirements.

Cement Squeeze Jobs, (such as the one herein described and illustrated) are becoming more and more popular as a means of cementing off the offending gas strata to bring the well within the gas/oil ratio allowable . . . and the tool used to accomplish this important operation is the Baker Cement Retainer (referred to in the accompanying excerpt as the "cement retainer.")

If excessive gas/oil ratios is a problem which confronts you, we suggest an investigation of this Baker Cement Retainer. What it *is* doing, and *has done*, for other operators in solving this particular problem, it can undoubtedly do for you.

Complete details concerning the design, operation and many important applications of the Baker Cement Retainer can be secured from any Baker representative or from any one of the conveniently located Baker offices.

See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY. 14-21

BAKER OIL TOOLS, INC.

Telephone JEfferson 8211 – HUNTINGTON PARK, CALIFORNIA – 2959 E. Slauson Ave.
Telephone WAyside 2108 – HOUSTON PLANT AND OFFICE – 6023 Navigation Blvd.

MID-CONTINENT OFFICE AND WAREHOUSE:
Telephone 2-6093 – Tulsa, Oklahoma – 312 East Fourth Street

WEST TEXAS BRANCH OFFICE
Odessa, Texas – Telephone 217

EXPORT SALES OFFICE
Box 1914 – 19 Rector St. New York City
Tel. Digby 4-5515

ROCKY MOUNTAIN HEADQUARTERS
Tel. 2230-Casper Wyoming – Box 1444

BAKER CEMENT RETAINER

Running Tour
WITH MEN IN THE INDUSTRY

EMBY KAYE, vice-president in charge of refining for the Skelly Oil Company and an employee of the company for 20 years, resigned March 31, and is now general manager of the Idaho Refining Company, Pocatello, Idaho, and of Inland Empire Refineries, Inc., Spokane, Washington, both of which are subsidiaries of Wasatch Oil Refining Company, Salt Lake City, Utah. **K. J. SMITH,** superintendent of the Skelly refinery at Eldorado, Kansas, will retain that position but will also serve as acting head of the refining division of the company.

LINCOLN M. ARNOLD and **R. C. EARLOUGHER,** formerly members of the engineering staff of the Sloan and Zook Companies, Bradford, Pennsylvania, have joined the Geologic Standards Company, Tulsa, Oklahoma, and will work on problems in water flooding of oil sands.

H. J. RUDDLE of Eastman, Dillon and Company, New York City, has been elected a director of Pacific Western Oil Corporation, according to an announcement by president **W. G. SKELLY.**

J. L. LATIMER has been appointed vice-president, director, and manager of pipe lines for the Magnolia Pipe

J. L. Latimer

L. H. True

Line Company and vice-president and director of the Magnolia Petroleum Company, succeeding **T. J. FITCH,** who has retired. Latimer has been assistant general manager of the Magnolia Pipe Line Company. **L. H. TRUE,** formerly general superintendent for Texas, Louisiana, and Arkansas, has been appointed assistant general manager of the Magnolia Pipe Line Company.

B. F. TOMBLIN, independent operator, has moved from Dodge City to Wichita, Kansas, and is blocking acreage in the name of the Midland Oil Company.

R. H. MAPLES, formerly division engineer for Cities Service Oil Company in East Texas, has joined the staff of the American Petroleum Institute's Division of Production as staff engineer in the Dallas office. He will assist in coördinating the work of the Central Committee on Drilling and Production Practice and that of the Central Committee on District Activities.

R. H. Maples

V. H. KELLY, director of sales, **R. E. HAYLETT,** director of manufacturing, and **A. C. RUBEL,** director of production for Union Oil Company of California, were elected to the Board of Directors at the last meeting of stockholders. They were also made members of the executive committee, which was enlarged from six to nine members.

H. J. HAWLEY, formerly general manager of the Standard Oil Company of Texas, has been appointed manager of the exploration division of the Standard Oil Company of California. **A. J. CUNNINGHAM** succeeds him, and **V. G. LUND** takes Cunningham's former position as assistant production manager, but will maintain headquarters in Houston instead of Dallas.

W. TAPPE of Societa Anonima Romana, Bucarest, Roumania, stopped briefly in Dallas, Texas, recently while making a hurried trip through American oil fields.

ALBERT WRIGHT, general superintendent of Amiranian Oil Company, sailed from New York City recently for Iran, as did **R. L. KUSS,** who will work on the first drilling rig sent into Iran by the company. **K. THEODORE TAGGERT, GEORGE J. BAKER, LESLIE BAKER RICHARDSON, SAMUEL ELLIS McDONALD,** and **CHARLES P. MacDONALD, JR.,** arrived in Bander Shapur on the Persian Gulf on March 19 with the first supplies for the rig. **H. A. AFSHAR,** formerly a member of the geological department, has joined the production department to assist in drilling the well.

R. G. GOUGH, formerly assistant production superintendent for the Continental Oil Company in the Wichita Falls district, has been transferred to Fort Worth as petroleum engineer for the Texas-New Mexico division.

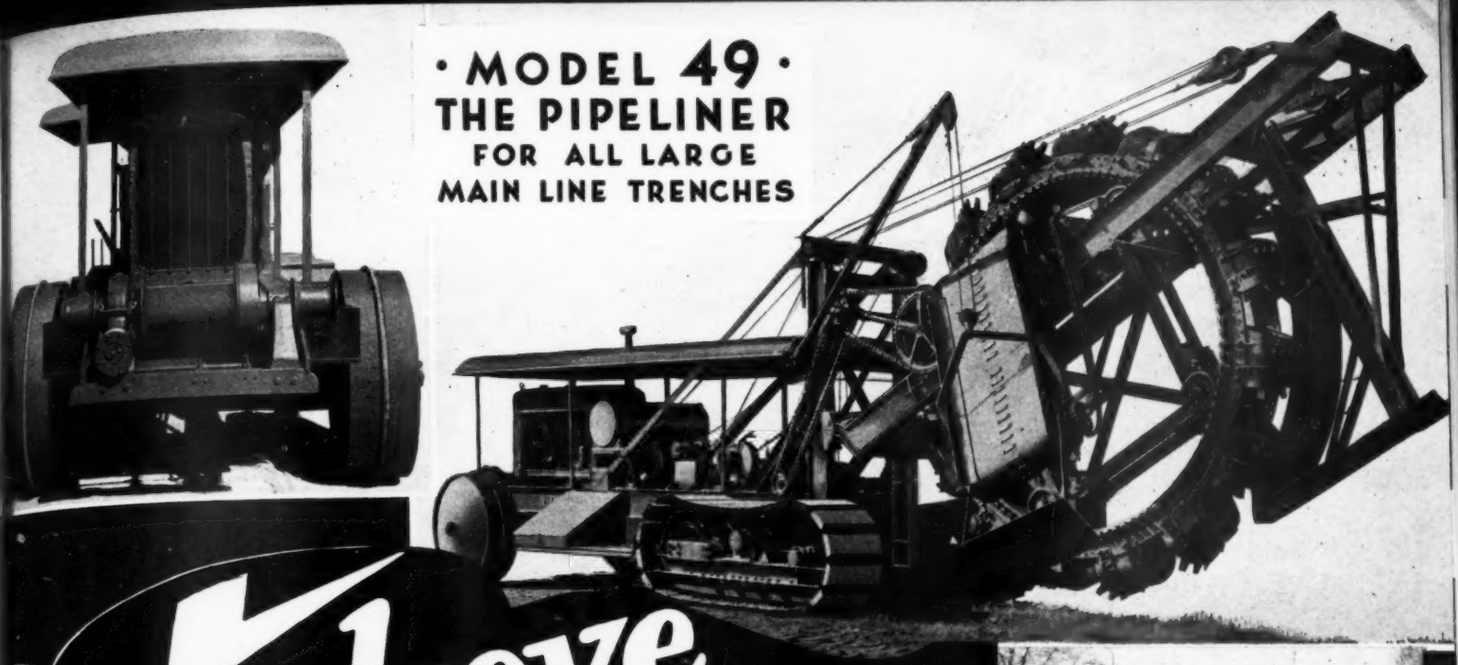
RAY G. COCANOWER, formerly manager of Olney Oil and Refining Company, Olney, Texas, and later of Waggoner Refining Company, Vernon, Texas, has joined the staff of Universal Oil Products, Chicago, Illinois, and will represent that company in the Mid-Continent area.

FRED F. WALTERMIRE has been appointed superintendent of production and drilling of Continental

Fred F. Waltermire

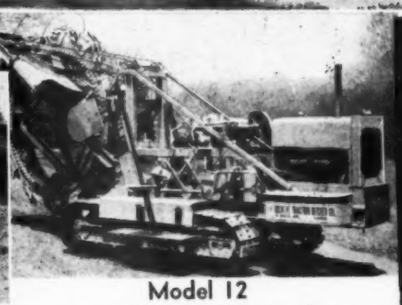
T. R. Batte, Jr.

Oil Company's Gulf Coast division. **T. R. BATTE, JR.,** has been appointed general superintendent of oil pipe line and terminal operations. Headquarters will be Houston, Texas.

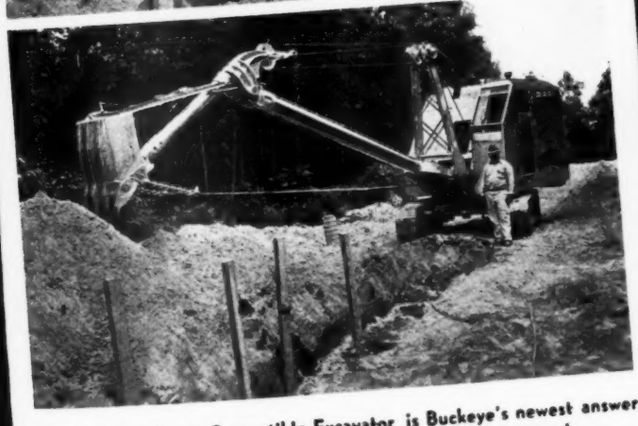


· MODEL 49 ·
THE PIPELINER
FOR ALL LARGE
MAIN LINE TRENCHES

Buckeye DITCHERS and EXCAVATORS



Model 12
for small main and service lines



The Buckeye Clipper Convertible Excavator is Buckeye's newest answer to the problem of economical and efficient earth removal.

Save you money ON ANY TYPE-SIZE OR LENGTH OF ditching job.

New Modern models for every trench requirement, give you the last word in engineering for speed, accuracy, reliability and final economy.

As originators of the wheel type ditchers and builder of the equipment used on the most important pipe lines the world over, we offer you the experience of a third of a century in pipe line excavation equipment — the kind of experience that results in profits to you.

Buckeye ditchers have dug the trench for more miles of pipe line than all other makes of ditchers in the world — and today, more Buckeye Ditchers are in operation than any other ditchers built.

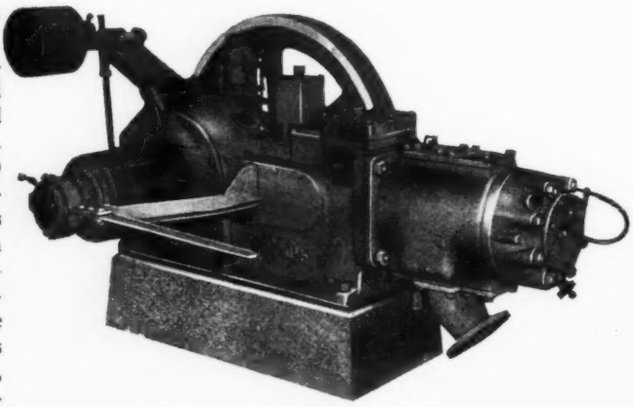
Buckeye has the answer to every ditching problem. It will pay you to consult our engineers before you start any ditching project, large or small.

THE BUCKEYE TRACTION DITCHER COMPANY
• FINDLAY, OHIO •

Builders of Excavating Equipment for over 1/3 of a Century

MACHINERY and EQUIPMENT

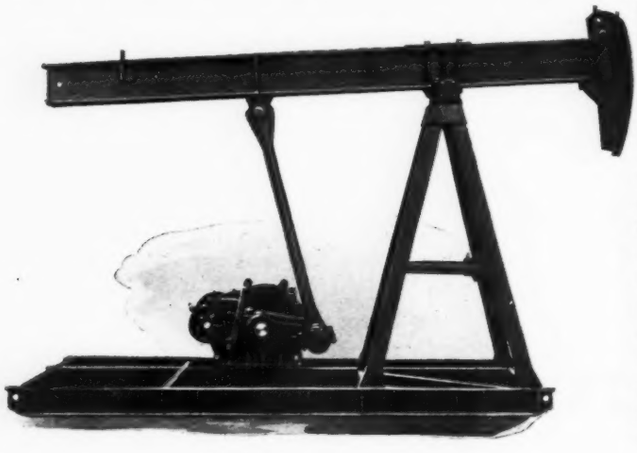
Reid "Terrier" Engine; Reid UP-10 Pumping Unit



THE Reid "Terrier" 7½-in by 9-in. single-cylinder, horizontal gas engine, rated 14 hp. at 250 r.p.m. to 30 hp. at 550 r.p.m. for continuous operation, is the latest addition to the line of oil-field engines manufactured by the Joseph Reid Gas Engine Company, Oil City, Pennsylvania. This engine is modern in every respect, has Timken main bearings, and includes many features of design incorporated in all Reid engines. Controls are conveniently mounted in one assembly and all are readily accessible. It is entirely enclosed, dust-proof and oil-tight. Features of the design include removable cylinder head, metallic piston rod packing, patented crosshead clamp connection, and rotary type magneto. The engine is supplied as a standard engine with two flywheels for attaching the conventional type clutch rig, or with one heavy flywheel and the Reid patented takeoff with Timken bearings, Reid cone clutch, and either V-belt or flat-belt pulley. Application of the Reid takeoff-bed idler combination permits the use of the engine on units where short belt centers are desirable. Reid bulletin No. 87 will be sent upon request.

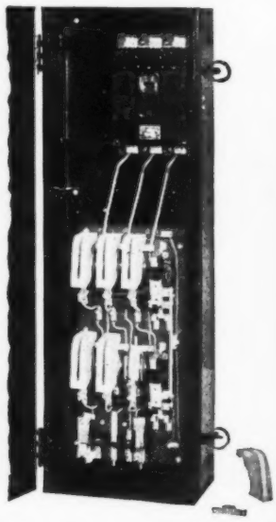
The Reid Type UP-10 Pumping Unit is of the single-crank, beam-balanced type, rated 10 hp. at 20 s.p.m., with a maximum polished rod load of 10,000 lb. and 37-in. stroke. Special care has been taken in the design to provide proper bearings and adequate lubrication for the bearings.

The base is of welded construction and of sufficient length to permit mounting of the prime mover on universal slide rails bolted to the base. The gear box is the Foote Brothers 12-DO unit. A brake is standard equipment. The counterweights are individually clamped to the beam, and equipped with handles, a construction that makes it easy and safe to add or remove weights, according to the manufacturers. Detailed information is given in bulletin No. 85.



G-E Magnetic Reversing Switches with Air Circuit Breakers

THE outstanding advantages of combination reversing magnetic switches that employ air circuit breakers have resulted in the development, by General Electric's Industrial Department, of a new line of such devices. This line, which was designed as alternative equipment for fused motor-circuit switches, has such features as low installation cost, space economy, and increased safety, the manufacturers state. The new combination reversing switches are primarily intended for the full-voltage starting of a-c. motors.



The equipment is particularly suitable for use where short-circuit protection for individual motors is desirable and as a means of disconnecting the power-supply line to switch and motor. The complete device consists of an air circuit breaker, two magnetic contactors mechanically interlocked, and a temperature overload relay, all enclosed in a sheet-metal case for wall mounting. The enclosing case is designed to permit operation of the air circuit breaker while the cover is shut. In addition, the device offers the advantage of low maintenance because the breaker can be readily reclosed after it has tripped on short-circuit, the manufacturers state.

LIFE IS TOUGH
on sucker rod couplings

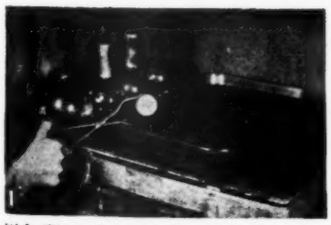
AXELSON'S CANDID CAMERA SHOWS HOW COUPLINGS ARE PREPARED FOR A LONG LIFE OF SERVICE IN AN OIL WELL

Wherever man pumps oil from the earth, Axelson Deep Well Plunger Pumps are busy night and day. Sucker rods, connected by hardened and ground couplings, join motive power on the surface with the pump thousands of feet below. Axelson's candid camera shows, step by step, the production of couplings and how they are built to give longer, more satisfactory field service.

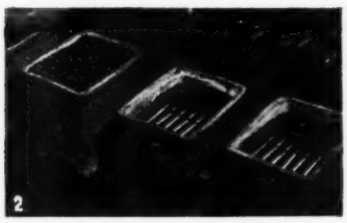
Axelson production methods are the result of more than 46 years experience in the building of oil well equipment. Every laboratory test, every manufacturing operation, every plant test has but one objective,—namely, the production of a sucker rod coupling that will meet satisfactorily every field test required of it.

Chemical and metallurgical tests are made in Axelson laboratories on samples from every heat of coupling bar stock. Stock that does not meet Axelson specifications is rejected.

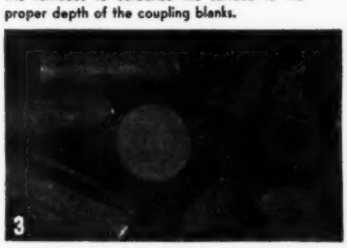
Each coupling is placed on an accurately threaded mandrel and faces are ground square with the thread. Thus Axelson reduces to a minimum the possibility of fatigue strains which reduce service life.



Wafer thin samples are cut from every piece of bar stock from which couplings are made and acid etched to verify specifications and to reveal any flaws existing in the raw material.



Blanks are placed in nichrome boxes and covered with carbonacious material, then heated in electric furnaces to carburize the surface to the proper depth of the coupling blanks.



Several specimens from each box are tested for depth of case which controls the depth of hardness of the finished couplings.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

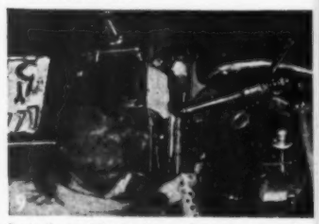
Carburized blanks roll down the trough into this machine which automatically drills, rough reams, faces, and forms the radius of one end. The same process is repeated on the other end.

Wrench flats are next milled before couplings are hardened. At this point each coupling has been inspected six times and must pass seven more inspections before completion.

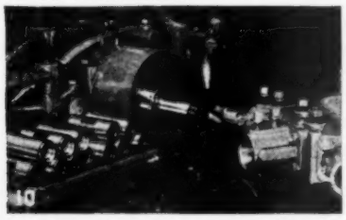
This automatically controlled furnace provides the particular heat treatment previously determined by laboratory test. After heating the couplings pass on into the quenching tank.

Drawing of couplings in the homo electric furnace relieves quenching strains. The carburized area is now very hard, offering greater resistance to abrasion and friction.

Immediately after the drawing operation and before the couplings are finished several couplings are selected at random from each lot and tested for Rockwell hardness.

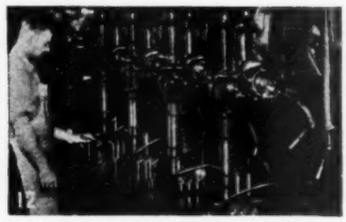


Centerless grinding makes each coupling smooth, essential for frictionless operation within the tubing. Couplings are again inspected before they are passed on for finished machine work.



Form reamers (same length as coupling) finish each end and I.D. This operation assures the cone and bore being in alignment and also square with faces.

Between reaming and tapping all blank couplings are gauged with a blank taper gauge to verify that the reamed blank is perfectly concentric with each end and that the cone is correct.



Taps are run completely through the coupling on multiple spindle geared drill presses. The taps are released so that it is unnecessary to back them out risking distorted threads.

"Go" and "no-go" gauges hold Axelson couplings to rigid allowable A P I tolerances. Couplings are made up with Axelson rods at the plant to greater tension than they will meet in service.

A feeler gauge is used to inspect the faces of the shouldered couplings and to assure that these faces are square with the axis of the threads.

The couplings are washed in a hot spray washer and dried, after which they are dipped in a protective solution for rust prevention. They are then boxed for shipment.

AXELSON

DEEP WELL PLUNGER PUMPS

SUCKER RODS

Axelson Manufacturing Company, P. O. Box 98, Vernon Station, Los Angeles • St. Louis • 50 Church Street, New York • Tulsa

Mid-Continent and Eastern Distributor: Frick-Reid Supply Corporation • *Rocky Mountain Distributor:* Great Northern Tool & Supply Company.

Mud Sol Well-Treating Service

K-D Mud Sol well-treating service is now offered in the Gulf Coast, South Texas, and Arkansas districts exclusively by the W-K-M Company, Inc., Houston, Texas.

K-D Mud Sol treatment thoroughly dissolves paraffin, asphalt, drilling mud, and other crusts from both the well screen and the formation, and provides for a natural entrance of all the oil in both old and new wells, officials of the W-K-M Company state.

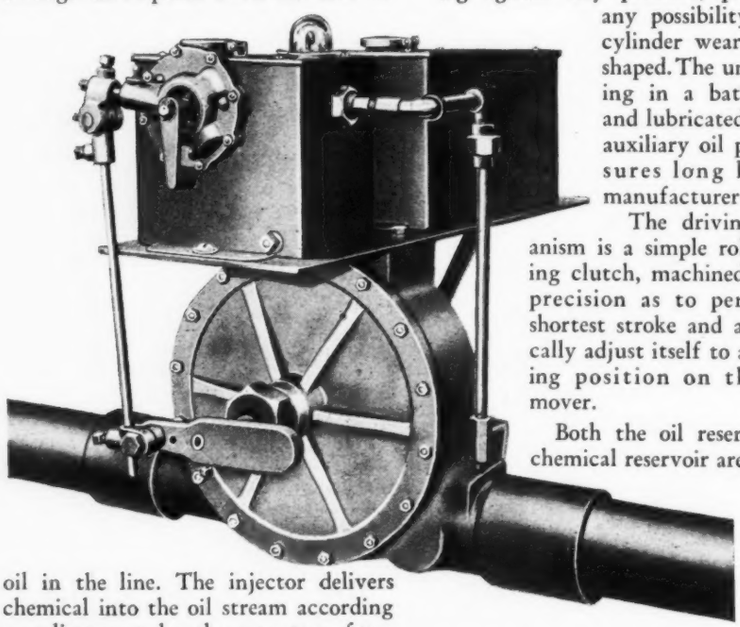
As proved in more than 500 wells treated in California, Mud Sol materially increases the production when such obstructions exist, it is stated. Many operators have recognized the value of treating new wells, many of which do not come in properly due to the sheath of rotary drilling mud that has penetrated the producing formation.

W-K-M has complete truck units equipped with chemical tanks, pumps, etc., to apply Mud Sol treatment. It is not necessary to pull screen.

In writing W-K-M, operators should give the history and characteristics of their wells.

American Lubricator Announces Chemical Injector

A NEW force- and sight-feed chemical injector has recently been placed on the market by American Lubricator Company, Dallas, Texas, manufacturer of the well-known "Standard" Lubricator. Chemical is automatically pumped from a 7-qt. chemical container by a regular "Standard" Lubricator, which is actuated through an impeller from the flow of oil in the line. The injector delivers chemical into the oil stream according to adjustment by the operator—from one drop every 30 revolutions to one gallon in seven hours at ten revolutions per minute. The sight feed shows the exact amount of chemical being delivered.



The pumping unit is made of high-grade die casting having a case iron insert for cylinder, into which a stainless steel non-corrodible plunger is ground and fitted to precision. This pressure plunger is held in alignment by a specially-designed bridge unit, independent of the reservoir, so that it is held on an exact line with cylinder, working against any pressure, precluding any possibility of the cylinder wearing egg-shaped. The unit working in a bath of oil and lubricated with an auxiliary oil pump insures long life, the manufacturers state.

The driving mechanism is a simple roller-bearing clutch, machined to such precision as to permit the shortest stroke and automatically adjust itself to any driving position on the prime mover.

Both the oil reservoir and chemical reservoir are made of heavy formed steel to withstand hard usage, and are plated to make them non-corrodible. These are attached to a ⅜-in. boiler plate base, also non-corrodible, insuring a sturdy compact unit.

Standard Sight and Force Feed Chemical Injector is a step forward in "standardization" as all parts are interchangeable with Standard Lubricators, except auxiliary oil pump and suction connections to chemical reservoirs.

All moving parts subject to wear are made of hardened steel; all joints are ground to close precision; all parts subject to corrosion are made of non-corrodible metal.

MacClatchie Quick Union Swivel

IN response to requests by cementing companies and other users in the United States and foreign fields, the MacClatchie Manufacturing Company, Compton, California, has brought out a new development of their Quick Union Connection. Known as the Quick Union Swivel, this equipment combines all the worthwhile features of the Quick Union and, in addition, has a swivel connection built into the elbow to provide complete and continuous rotation while circulation is maintained through the joint, the manufacturers state.

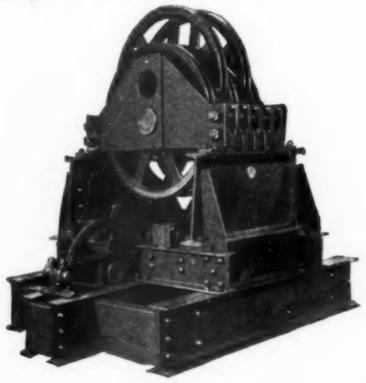
By means of the Quick Union a safe connection can be quickly made that is pressure-tight under the most severe operating conditions, it is said. In making connections there are no threads to screw up and no danger of cross-threading. This speed feature is particularly appreciated in emergencies.

After the connection has been made with the Quick Union, the swivel element allows lead-in pipes, hoses, etc., to rotate freely without loosening joints or threads. Two rows of ball bearings are used in the swivel element to assure easy rotation and enable the swivel to withstand the most severe usage. An Alemite fitting is provided for quick and positive lubrication.

The new MacClatchie Quick Union Swivel can be used for all cementing and circulating operations, as well as loading racks and other refinery installations. On cement head manifolds this swivel union provides a shorter hook-up and still retains the advantages of the swivel in the manifold, the makers say. The complete swivel and union is only 3 in. longer than the standard Quick Union.

Regan Crown Block

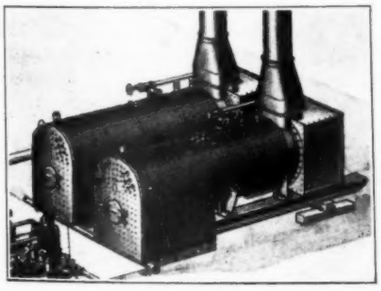
EMBODYING several advanced engineering principles, the Regan 7-8-9-sheave crown block has been developed. It is designed for capacities of 300 tons for the seven sheave and 360 tons for eight and nine sheaves; it is designated as type EA and is of extra-



heavy construction. All castings with the exception of the sheaves and minor separation parts are eliminated. Sheave beams supporting the bearings are of rolled steel plates welded together and surfaced on both sides to a true plane. The upper deck sheaves are 48 in. and the lower deck are 36 inches. The sheaves are chrome-alloy cast-steel grooved for 1-in., 1⅛-in., or 1¼-in. diameter wire line. The manufacturers, Regan Forge and Engineering Company, San Pedro, California, will gladly supply further information.

"Oilwell" Flexible-Blanket Insulation for Oilfield Boilers

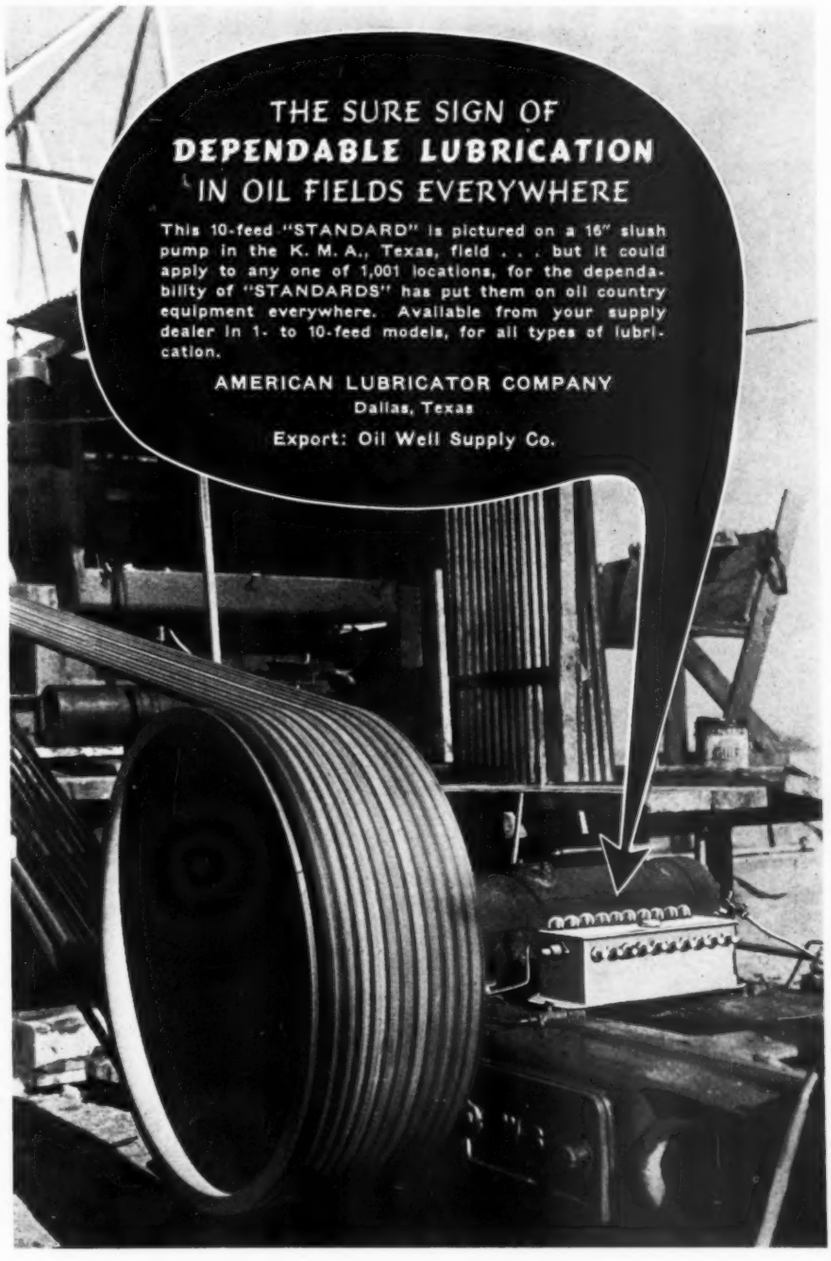
WITH substantial savings in fuel costs being effected by the use of modern steam-saving rotary-drilling machinery, operators are becoming more and more conscious of the heat losses due to radiation and convection from uninsulated boilers, say officials of the Oil Well Supply Company, Dallas, Texas. These heat losses are now being given careful consideration not



only from the standpoint of fuel economy but also from the standpoint of boiler capacity. Although not in general use in the past, oilfield boiler insulation has demonstrated in carefully conducted tests that it effects very noticeable savings in fuel consumption and increases boiler capacity.

Believing that the general use of boiler insulation in the oil fields has been retarded by the high cost of keeping insulating material in repair when rigs are moved, Oil Well Supply Company has introduced a flexible-blanket insulation that withstands hard usage and is easy to install and remove in the field. "Oilwell" Flexible-Blanket Insulation is resistant to the deteriorating action of both heat and moisture. It consists of an inner sheet of strong wire-inserted asbestos canvas, a filling of mineral wool, and an outer covering of weather-proofed and mildew-proofed wide-numbered duck. Quilting holds the mineral wool in place.

"Oilwell" Flexible-Blanket Insulation is supplied in sections, which are wrapped around the steam generator or boiler and are easily handled in the field. Sections are made up to fit the "Oilwell" Portable Superheated Steam Generator (illustrated) and all sizes and makes of oil-country boilers. The construction and application of this flexible insulation and the savings it effects are described in "Oilwell" Bulletin No. 185. A copy may be obtained from any Oil Well Supply Company branch without charge or obligation.


THE SURE SIGN OF
DEPENDABLE LUBRICATION
IN OIL FIELDS EVERYWHERE
This 10-feed "STANDARD" is pictured on a 16" slush pump in the K. M. A., Texas, field . . . but it could apply to any one of 1,001 locations, for the dependability of "STANDARDS" has put them on oil country equipment everywhere. Available from your supply dealer in 1- to 10-feed models, for all types of lubrication.
AMERICAN LUBRICATOR COMPANY
Dallas, Texas
Export: Oil Well Supply Co.

Wire-Klad Air Filter

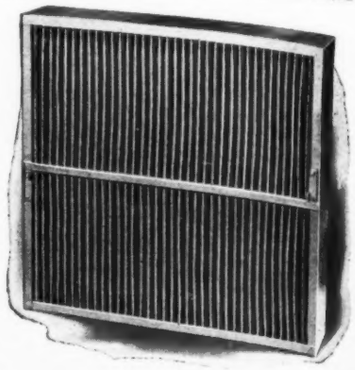
RECENTLY announced by Staynew Filter Corporation, Rochester, New York, manufacturers of Protectomotor products, is a new dry type air filter possessing, according to the makers, unusual advantages for industrial and domestic air conditioning.

The new filter, known as the Wire-Klad, has, among others, the particularly desirable feature of flame-resistance, fulfilling the provisions set forth in Section 150 of the National Board of Fire Underwriters, Pamphlet No. 90.

The descriptive name, Wire-Klad, refers to the wire mesh reinforcement of the fins. The fin construction, a well-known Protectomotor principle, affords large filtering area in relatively small space. The wire mesh reinforces the filtering medium so strongly that the filter can be cleaned indefinitely by high-pressure air or vacuum.

Several kinds of filtering media are available to suit varying conditions. The most usual are cotton or a wool felt-like material known as Feltex. This latter medium is practically impervious to the passage of even microscopic dust particles, yet offers extremely low resistance to air flow.

Economy is an important point in favor of this new air filter, the manufacturers state. Although the highest grade materials and workmanship are used throughout, the intitial cost is low, due to careful design and the ingenious use of wire mesh, it is stated. As mentioned, cleaning is practical and simple with either air pressure or vacuum.



If exposure to oil or greasy substances makes cleaning with a solvent necessary, the wire reinforced filter insert can be easily lifted from the frame. Besides low initial cost and easy cleaning, this new filter also possesses the advantage of low replacement cost when finally worn out, as only wire reinforced filter insert need be replaced, it is pointed out.

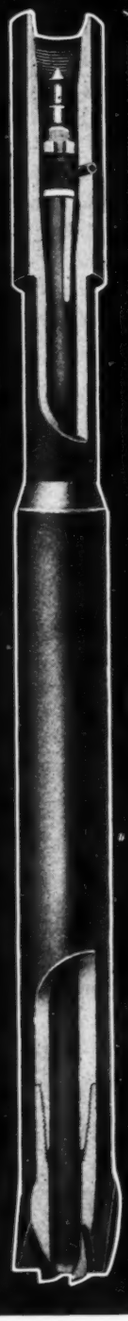
Standard and special sizes are available. There are three standard depths, 2 in., 4 in., and 6 in., and four standard sizes, 20 in. by 20 in., 16 in. by 20 in., 16 in. by 25 in., and 20 in. by 25 inch. With the thought in mind that many installations require special sizes, these will be supplied at no extra cost if within reasonable limits.

HUNT

Wire Line

CORE BARREL

The outstanding success of the HUNT WIRE LINE CORE BARREL was not made on the superiority of the Barrel alone . . . but with the aid of SERVICE as dependable as the Barrel itself. Service is a major factor in coring, and the Service behind the HUNT BARREL is known from the Mississippi to the Rio Grande!



HUNT TOOL COMPANY
HOUSTON, TEX.
Formerly AUTHORIZED APPLEMAN BIT SERVICE CO.
HUNT WIRE LINE CORE BARRELS

Headquarter Office & Plant
HOUSTON, TEXAS

Field Shops: Joinerville, Talco, Corpus Christi, Bay City, Alvin, Texas . . . Rodessa, Jennings, Houma, Louisiana.

Soft Formation Core Head

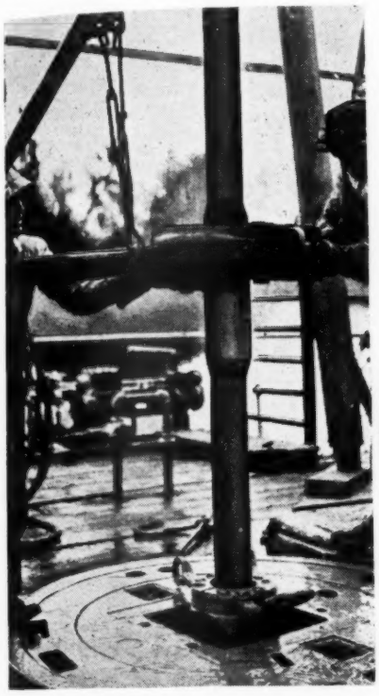
Hard Formation Core Head

Improvements to J & L Integral Joint Drill Pipe

WITH the shipment this month of several strings of its recently-improved integral joint drill pipe, The Jones and Laughlin Steel Corporation, Pittsburgh, Pennsylvania, announces further important refinements in this product, which it has supplied to the oil trade for several years.

As in the past, this improved drill pipe has a forged upset tool joint integral with the pipe, which eliminates the conventional type tool joint. However, this design has been further perfected by an increase in the overall length of the upsets on the pin and box ends by a new special heat treatment of the upset and by the use of an improved J & L Blue Ribbon steel in its manufacture, it is stated.

The lengthening of the pin end of the pipe eliminates the necessity of tonging on the body of the pipe itself, thereby preventing the possibility of physical damage to the pipe by the crushing action of the tongs. In the new, as in the previous design, sufficient stock is provided on the upset box and pin ends for re-threading which can be done in any oil-country



A string of the recently-improved J & L integral joint drill pipe being run in the hole

shop. No heat treatment is required before or after the re-threading operation.

The lengthening of these upset ends has been made possible by the installation in the Jones and Laughlin mill of an upsetter developed especially for this work on specifications by the J. & L. engineering department. Said to be the first of its size ever built, this huge upsetter is not only capable of forging the longer upset of the new design, but has made possible the manufacture of integral joint drill pipe in two new large sizes, 5 9/16 in. O.D., and 6⅝ in. O.D.

After the upsetting operation and before threading, the entire joint is heat-treated so that maximum physical properties in strength and hardness are obtained with maximum toughness as measured by ductility and impact strength. This heat treatment in well-made steel of this grade produces a metallographic structure of exceptional refinement and results in a hardness in the tool joint end of the integral joint drill pipe comparable to that commercially available in a tool joint of conventional design, it is stated by the makers.

The improved J. & L. Blue Ribbon grade of steel used in the manufacture of the integral joint drill pipe was made possible by changes in composition that impart structural stability without temper brittleness so that the desirable variation of properties can be accomplished with no sharp variations to form points of weakness.

The early advantages of the integral joint drill pipe have been retained in the new design. The smooth, easy change of diameter in the interior of integral joints, which greatly reduces turbulence and gives increased mud volume with reduced mud pump pressures, is even more streamlined and lends itself readily to advanced ideas in drilling practice. The cost of assembling tool joints on drill pipe is eliminated. The possibilities of washouts and twist-offs in the threaded connection of drill pipe to conventional tool joint are also eliminated by the use of integral joint drill pipe, it is stated.

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INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY. 14-21

SQUARE END CUTS

..without burr on 2- to 4-inch pipe — an easy task with a "TOLEDO" No. 40 Automatic Pipe Cutter.

Knives are fed automatically, requiring no attention on the part of the operator except to see that they are kept sharp. A part turn of a hand wheel sets the knives for cutting, or the quick return after the pipe is cut off. Positive scroll feed.

Also made in larger size. No. 80 cuts off 4½- to 8-inch pipe.

Sold by leading Oil Well Supply Dealers. Complete information sent on request.

THE TOLEDO PIPE THREADING MACHINE COMPANY
TOLEDO, OHIO NEW YORK OFFICE, 72 LAFAYETTE STREET

"TOLEDO"
TRADE-MARK REGISTERED
FOR EVERY PURPOSE

Armstrong Announces Line of Wrenches for Hollow Screws

ARMSTRONG Bros. Tool Company, Chicago, Illinois, announces a new line of wrenches for hollow screws. Now instead of wrenches formed from lengths of hexagonal bar stock, the user of hollow screws can assemble a tool of size, shape, and length needed from a set of interlocking drivers, handles, extensions, and ratchets.

The Armstrong Hollow Screw Wrench resembles in general a detachable head of a socket wrench, but instead of a socket to fit over a screw head, they have a protruding hexagonal driver that fits into the hollow screw. Ten sizes fit all hex nut hollow screws and cap screws from ¼ in. to 1 in. in diameter. An AL-100 set, illustrated, consists of ten wrenches, two reversible ratchets, three sliding T-handles, two extensions, and an adapter in a fitted steel case. The wrenches, handles, and extensions are made of chrome-vanadium tool steel. The reversible ratchets are drop-forged with hardened-steel gears, and it is claimed have an improved action. All wrenches and parts are chrome plated.

KNOW THESE THINGS ABOUT COLLAR SOCKETS

Fig. 611

1. ***Where to Use Them.*** **Collar sockets are used to take hold of cable-tool joint collars, where there is little clearance between the collar and pipe. All sockets are very thin and should not be used where tools are tight, nor where jarring is necessary.**

2. ***Where to Get Them.*** **For best results, and for economy, specify the Spang *Multi-Slip* type. All Spang Collar Sockets are of alloy steel, correctly heat-treated, of precision manufacture.**

Write for catalog showing the complete line of Spang "Higher Standard" Cable Tools.

SPANG & COMPANY
BUTLER, PA.

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TULSA
MAY. 14-21

Specify Spang
"HIGHER-STANDARD" CABLE TOOLS

Security Drillable Products

THE Security Engineering Company, Inc., Whittier, California, has placed on the market a new line of oil-field equipment for use underground that can be quickly "drilled up" when occasion demands. These new products, known as Security Drillable Products, are made of "Securaloy," a tough, strong metal alloy that machines, perforates, and threads the same as steel, the manufacturers state. Having a specific gravity only slightly greater than shale, it readily circulates out of the hole with the drilling fluid, it is stated.

The Security Drillable Products create entirely new procedures, new safeties, and new efficiencies in oil-field production and testing methods, it is claimed. When set in producing zones they provide for the future reconditioning or deeper development of wells, and eliminate the hazards that arise when they become lost, wedged, or frozen in the hole. They are easily and quickly drilled up. In addition to conventional liner installations, these drillable products permit new, efficient production methods, and aid in the solution of other oil field problems by making possible procedures heretofore

impractical, according to the manufacturers.

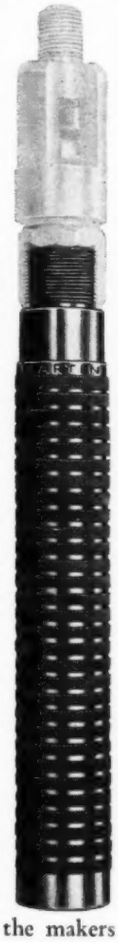
Besides drillable production liners, cementing equipment and production testers, a complete line of Security Drillable Accessories is available. This includes: Adapters, bull plugs, collars, liner hangers, packers (all types), pipe, pipe fittings, pipe nipples, and reducers.

Although "Securaloy" can be drilled up with conventional types of piloted drilling bits, the Security Engineering Company, Inc., is also manufacturing a line of special drilling bits that are engineered to drill up this new material with maximum speed and efficiency.

Complete information on the uses of "Securaloy" in solving modern drilling and production problems can be obtained from Security Engineering Company, Inc., Whittier, California.

Martin Pump Plunger

DURING the last ten months John N. Martin, Manufacturer, 1507½ East 11th Street, Tulsa, Oklahoma, has patented and placed on the market a new type pump plunger for use in common barrels and insert pumps. According to the manufacturer a new principle in the use of composition packing rings is employed, whereby each ring is held independently so that there is no packing down, such as has occurred in previous ring-packed plungers. Simplicity is a feature, the body being of one piece with ring grooves machined in it and packing rings mounted in the grooves just as piston rings are mounted in a piston. The packing rings swell in well fluids and the swelling serves both to tighten the rings in the grooves and to seal the cuts. The plungers are generally given a short dip in either gasoline or kerosene just before running into the well.



Plungers are made in various lengths to take care of different well depths. About one packing ring per 100 ft. of depth is recommended. Among the economies claimed by the makers are low first cost, longer runs without pulling, small cost of ring replacement, lighter rod loads, and longer wearing life for barrels and pump tubes.

Atlas Pumping Units

ATLAS Supply Company, Muskogee, Oklahoma, has recently introduced eight new series of pumping units, each series having several units. To illustrate and describe these units a set of eight separate bulletins has been published, any or all of which may be had by oil men upon request. The new units are classified as to series according to capacity: 5000 lb., 9000 lb., 12,000 lb., 15,000 lb., 20,000 lb., 22,000 lb., 25,000 lb., and 27,000 pounds. To simplify specifications, illustrations and general information, the bulletins each cover one series.

McKay Line of Electrodes

A COMPLETE line of shielded-arc welding electrodes, claimed by the manufacturer to be quieter in operation, faster in welding time, produce finer bead appearance, and have greater adaptability per rod, is offered by The McKay Company, Pittsburgh, Pennsylvania.

The makers state that, although the new electrodes are of an improved type, no changes in customary operating practice are required.

A folder describing the line of electrodes may be obtained by writing the Pittsburgh office of The McKay Company.

For

Ordinary Cleanout Work

•

Breaking Hard Packed Sand Bridges

•

Cleaning out Bridged-Over Tubing

•

Partially Collapsed Pipe

•

Open Hole Territory

•

Fishing Out Junk

•

Cleaning Out Around Large Fish

•

Washing Perforations

CAVINS

Automatic-Hydraulic

SUCTION BAILER

FISHING TOOL

PERFORATION WASHER

The Cavins has no equal for the well-cleaning operations listed above. It eliminates spudding, or rigging up standard tools, and is adaptable to all well conditions. Its quick automatic loading and dumping features make it possible to clean out a well thoroughly and put it back on production in record-breaking time. Saves time, money, labor and production. It's genuine economy to have the Cavins always immediately available. Illustrated Bulletin No. 38 sent on request.

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THE CAVINS COMPANY

2853-73 Cherry Avenue — Long Beach, California

Cable Address: "Cavins, Long Beach" • Foreign Representative: R. J. Eiche

BRANCHES

CALIFORNIA: Bakersfield, Taft, Ventura • KANSAS: Lyons • TEXAS: Houston, Corpus Christi, Kilgore, Odessa, Monahans, Wichita Falls • OKLAHOMA: Ada • NEW MEXICO: Jal, Lovington • San Fernando, Trinidad, B. W. I.

Crane Company Bar Stock Valves

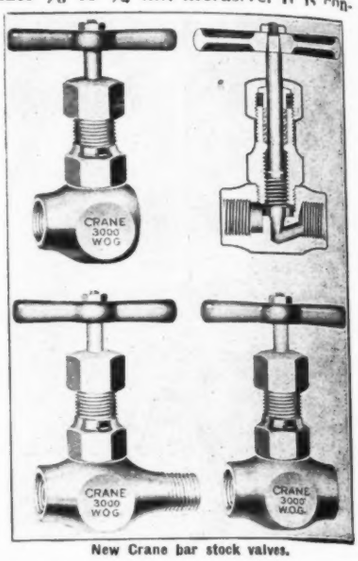
THREE new bar stock valves having uses in almost every industry are being introduced by Crane Company, Chicago, Illinois. These small 3000-lb. W.O.G. plug-type disc, globe, and angle valves are called bar stock valves because their bodies and bonnets are made from solid bar stock. They are considered ideal for connections on orifice meters, regulator leads, by-passes, gauges, for use as expansion valves on ammonia lines, and for many similar services where accurate regulation of flow is desired or where parts of measuring instruments must be protected against the sudden release of high pressures, the manufacturers state.

The Exelloy valves are particularly suitable for handling oil or gas containing sulphur compounds or for installations where steel valves do not have sufficient resistance to atmospheric corrosion, it is stated.

The 18-8 alloy valves are especially suited for oil and gasoline containing hydrogen sulphide or sulphur dioxide when moisture is likely to be present.

All of these valves may be packed when wide open when under pressure. They are supplied either in steel, Exelloy, or 18-8 chrome-nickel alloy.

The new globe valve, No. 222½, is made with male and female ends in sizes ⅛ to ¾ in., inclusive. It is considered especially convenient where it is desirable to screw the valve directly into equipment having a female opening, thus eliminating the need for a nipple, the makers point out. Sizes ⅛ in. and 1 in. also are being added to the existing Crane line of bar stock valves known as Nos. 222 and 223. Crane bar stock valves, therefore, now include the globe and angle patterns with female ends in sizes ⅛ to 1 in., inclusive, and the new globe pattern with male and female ends mentioned.



New Crane bar stock valves.

SURWEL

GYROSCOPIC CLINOGRAPH

Sets a Remarkable Record

Continental Oil Company's World's record well at Wasco, California, was double surveyed to a depth of 11,500 feet with the "SURWEL" Gyroscopic Clinograph on a wire line—the deepest oil well survey ever made.

From the Log:

In-run started at - 10h 16m 35sec.

Bottom reached at - 11h 36m 12sec.

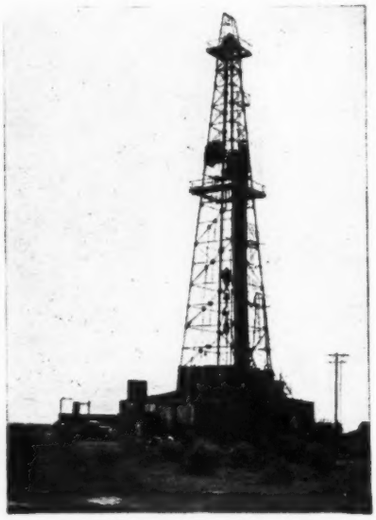
Out-run completed at - - - - - 12h 53m 47sec.

Total time for two surveys - - - - 2h 37m 12sec.

Closure between In and Out-run 9.3'

Maximum temperature recorded - - - - - - 210°F

Records taken every 100 feet



Continental Oil—K. C. L. A.-2 Wasco (near Bakersfield), California. The World's deepest well.

Sperry-Sun congratulates Continental Oil Company and their California staff for successfully drilling the deepest well in the World. A real achievement!

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INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY. 14-21

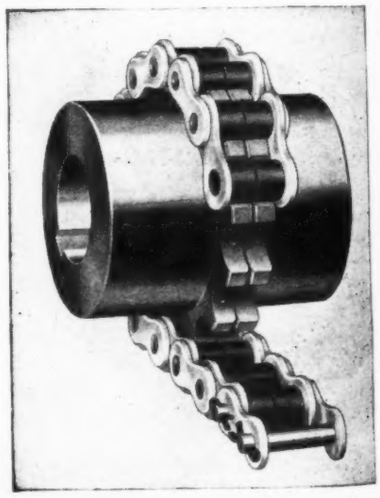
SPERRY-SUN WELL SURVEYING COMPANY
1608 Walnut Street, Philadelphia, Pa.

Tulsa, Oklahoma — 425 Petroleum Bldg.
Houston, Texas — 3118 Blodgett Avenue
Corpus Christi, Texas — 332 N. Mesquiteside Drive
Long Beach, Calif. — 549 E. Bixby Rd. (5800 Block Atlantic Avenue)
Bakersfield, Calif. — c/o Elks Club (17th and I Streets)
Lafayette, La. — Bank of Lafayette Bldg.

(U. S. Patents 1,124,068; 1,812,994; 1,898,473; 1,959,141; 1,960,038; 2,006,556; 2,012,138; 2,012,152; 2,012,455; 2,012,456 and others pending.)

Link-Belt Flexible Coupling

ANNOUNCEMENT is made by Link-Belt Company, Chicago, Philadelphia, Indianapolis, of the development of a new flexible coupling, Type "RCB," which embodies major improvements over the company's Type "RC" roller-chain coupling for connecting shafting in line.



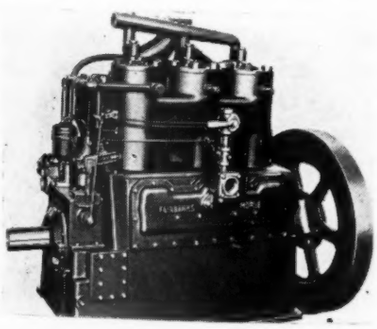
The new "RCB" coupling consists of two cut-tooth sprocket wheels (or coupling halves) that are connected by a piece of specially-constructed single-width finished steel roller chain, using a recently-patented divided-roller feature that combines the advantage of double roller chain with the more rugged and simple construction of single-width chain. The divided roller provides independent roller action for each sprocket, and as the contact between roller and sprocket causes the roller to revolve on its bushing, any tendency to scuff the rollers and sprocket teeth is said to be avoided. Longer coupling life, and extension of the range of efficient application, are claimed for the new coupling.

Other major improvements concern the grease-retaining housing or casing, which, when specified, is supplied for enclosure and automatic lubrication of the coupling. The most outstanding of these improvements is the use of two fittings, 180 deg. apart, inside the housing, to permit packing the housing with grease, without necessity of dismantling. Another improvement consists of providing a better seal between the halves, to avoid leakage of grease. To embody these changes, the size of housing has been increased slightly as compared with that supplied with the "RC" roller-chain coupling.

Booklet No. 1545 gives dimensions, ratings, and other data. A copy will be sent to any interested reader upon request addressed to Link-Belt Company, 519 North Holmes Avenue, Indianapolis, or other office of the company.

Gas and Oil Engine for Oil-Well Pumping

A NEW Fairbanks-Morse 2-cycle, vertical, convertible gas and oil engine, the Model 34-AC-6, has been developed to meet the particular requirements of oil-well pumping. It is a medium-weight, heavy-duty pumping engine built for continuous service. The speed, ranging from 300 to 850 r.p.m., is governor controlled, and the power output is high. Smooth operation and combustion as desired for oil-well pumping is obtained by a heavy flywheel and by a special governor arrangement that provides the correct degree of sensitivity to suit the load characteristics.



The 2-cycle principle of operation assures maximum dependability with minimum attention.

Low overall height satisfies requirements for accessibility and limited head room on high foundation structures. Top movement and excessive vibration is eliminated. When installed on structurals, steady operation without vibration is assured by correct counterbalancing, the manufacturers state. The lower base construction is such that in most cases installation on previously-designed structurals is possible without special rails.

The F-M Model 34-AC engine can be supplied with either standard or reverse rotation and with power take-off on either end to meet various operating requirements. These features enable the engine to be installed with the operating side accessible in driving single- or double-reduction and for left-hand or right-hand drive gears.

Grizzly Rotary Hose combines the strength of steel with the flexibility of rubber through an exclusive manufacturing process. Special carbon steel is imbedded in pure rubber, cushioned on both sides, covered with extra plies of heavy fabric — and the complete hose vulcanized under tremendous pressures.

Fully 50% stronger than any other rotary hose manufactured, it has proved its ability to stand up indefinitely under all emergencies such as stuck pipe, sticking bits, compounding of pumps, surge pressures, and other oil field nightmares. Your supply man will give details.

Ask about the Grizzly Rotary Hose Coupling Exchange. Saves time, trouble and money in hose installation.

E. M. SMITH COMPANY

600-650 South Clarence Street • Los Angeles, California, U.S.A.

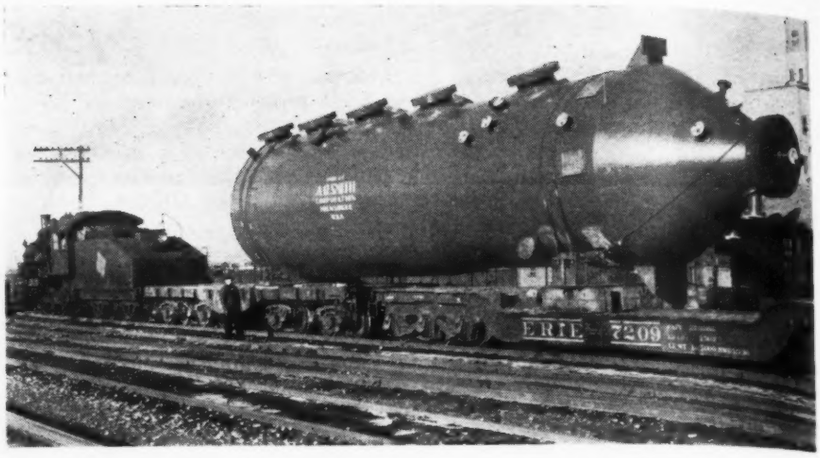
Complete Stocks Maintained in Our Warehouses At: 2311 West Street, Houston, Texas 1008 S. E. 29th St., Oklahoma City, Okla. Export Office: Continental Emsco Co., 30 Rockefeller Plaza, New York City

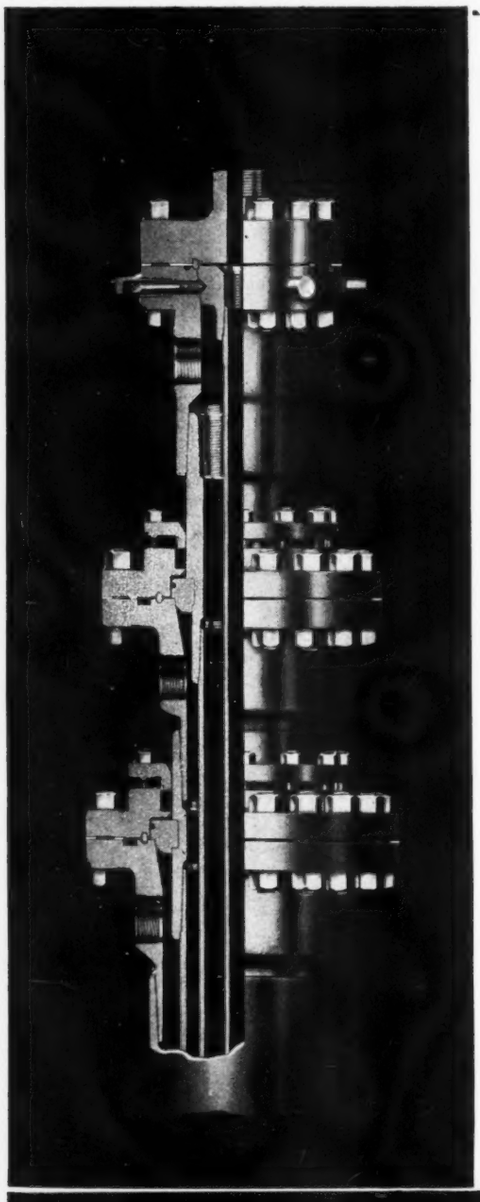
Distributed by Leading Supply Companies

The close position of the power take-off sheave allows placing the engine symmetrically and usually without "outriggers."

Principal parts are interchangeable on oil and gas engines, as well as on the 2- and 3-cylinder units, giving the operator maximum flexibility in applying units at various pumping locations.

Detailed information will be found in Bulletin 3400, available from Fairbanks, Morse and Company, Chicago, Illinois.





Makes Another
VALUABLE IMPROVEMENT!

Extended Recessed Coupling Offers These Profitable Advantages:

1. Permits mounting 10,000 pound-test tubing head directly on recessed coupling, eliminating nipple.
2. Retains the repackable feature not possible with spool type construction.
3. The thread you use in landing your pipe is not used as a permanent connection.
4. Provides safety below Christmas-tree, for unscrewing and stabbing over in case of wild well.

Every piece of equipment used in this book-up is HAMMER FORGED STEEL

The complete RECTORHEAD line will be on display for you.

See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY. 14-21

RECTOR

High Pressure Vessel

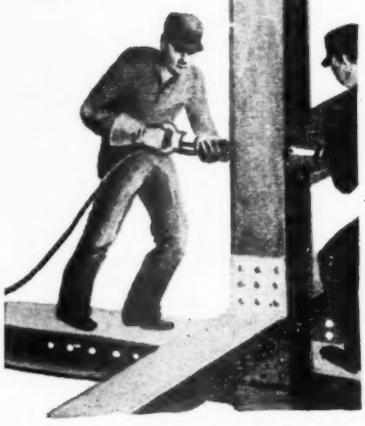
ONE of the heaviest pressure vessels ever built was shipped a few days ago by the A. O. Smith Corporation, Milwaukee, Wisconsin, to the Gulf Refining Company at Port Arthur, Texas. It marked the A. O. Smith Corporation's eighth pressure vessel shipment to the Port Arthur refinery in the last three months.

Weighing 393,800 lb., nearly 200 tons, this separating tower has an overall length of 61 ft., an outside diameter of 12 ft., and a maximum wall thickness of 3¾ inches. Of electric-welded steel-plate construction, it was lined on the inside with a corrosion-resisting chromium alloy by the patented Smith lining process.

The huge tower presented a difficult transportation problem. It was even proposed to float it through the Great Lakes and down around Florida. After careful study, however, a routing by rail was worked out by A. J. Bessolo, Pittsburgh, Pennsylvania, general traffic manager of the Gulf Oil Corporation. It involved enlisting the facilities of six different railroads in order to obtain safe clearance. Ten days were required for the shipment to make the 1000-mile trip from Milwaukee to Port Arthur because it could only be moved by daylight and at no more than 25 miles an hour.

Two flat cars, especially constructed to carry the enormous weight, were used and special blocking and swivels were employed to permit rounding of curves en route. The supporting brackets were left off two sides in order to bring the shipment within railroad clearances. The brackets must be bolted in place at the refinery.

SERVICE builders.



WELDED TOGETHER

as a single unit

Fashioned as steel upon steel . . . A service organization, flexible enough to yield to your specific demands—yet firm enough to provide faultless operation . . . that is

Affiliated

NATIONAL HOTELS

ALABAMA

THOMAS JEFFERSON.....Birmingham

ILLINOIS

HOTEL FAUST.....Rockford

LOUISIANA

JUNG HOTEL.....New Orleans
HOTEL DESOTO.....New Orleans

MISSISSIPPI

HOTEL RIVIERA.....Biloxi

NEW MEXICO

HOTEL CLOVIS.....Clovis

OKLAHOMA

OKLAHOMA BILTMORE.....Oklahoma City
HOTEL HUBER.....Muskogee
HOTEL BELMONT.....Okmulgee
HOTEL SAPULPA.....Sapulpa
HOTEL ALDRIDGE.....Wewoka

TEXAS

STEPHEN F. AUSTIN.....Austin
HOTEL SETTLES.....Big Spring
HOTEL BROWNWOOD.....Brownwood
HOTEL SOUTHERN.....Brownwood
HOTEL LAGUNA.....Cisco
HOTEL CLIFF TOWERS.....Dallas
HOTEL DONNA.....Donna
HOTEL CORTEZ.....El Paso
HOTEL TEXAS.....Fort Worth
HOTEL BUCCANEER.....Galveston
HOTEL JEAN LAFITTE.....Galveston
CORONADO COURTS.....Galveston
MIRAMAR COURT.....Galveston
HOTEL CAVALIER.....Galveston
HOTEL LUBBOCK.....Lubbock
HOTEL FALLS.....Marlin
HOTEL GHOLSON.....Ranger
HOTEL CACTUS.....San Angelo
ANGELES COURT.....San Antonio

VIRGINIA

HOTEL MOUNTAIN LAKE.....Mt. Lake

★ AFFILIATED ★
NATIONAL HOTELS ★ ★
HOST TO THE NATION

C-8-222

C. A. Perryman, of American Chain and Cable Company, Passes Away

Charles A. Perryman, district manager in the Mid-Continent area for the American Cable Division of the American Chain and Cable Company, passed away April 12 at his home in Houston, Texas. He was horseback riding when he suffered a heart attack, dying shortly afterwards. He was 53 years old.

Perryman was well-known and liked throughout the petroleum industry and his host of friends will be saddened by the news of his death.

Before joining the staff of the American Chain and Cable Company Perryman was oil country sales manager for the Wickwire Spencer Wire Rope Company. He became affiliated with the American Chain and Cable Company in 1927 as assistant general sales manager, his headquarters being in New York City. He was transferred to Houston five years ago.

Dick Tibbs to Staff Brown Oil Tools

Brown Oil Tools, Inc., Houston, Texas, announce the appointment of Dick Tibbs as sales representative in the South Texas territory, having his headquarters in Corpus Christi. Tibbs formerly was a member of the sales staff of Gulf Coast Machine and Supply Company in the Gulf Coast, and has had more than ten years' experience in the sale and service of oil equipment.

DICK TIBBS

Opportunity for

GERMAN CITIZEN

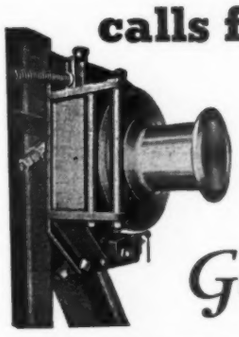
With sound experience in modern lubricating refinery, particularly solvent extraction, who desires to return to Germany permanently, for responsible position in executive capacity in lubricating plant there. Write fully experience and qualifications. No American-owned company involved. Applications treated confidentially if desired.

BOX 200

Care of The Petroleum Engineer
Allen Bldg., Dallas, Texas, U.S.A.

MODERN DRILLING

calls for a



Geared

CATHEAD

The high speeds at which many line shafts are being run in today's drilling operations makes it practically imperative that a cathead be geared down to reduce the terrific impact when breaking tool joints. Conventional catheads, when slowed down, lose most of their power, but not the MacClatchie Gearomatic. Due to its patented gear arrangements, it rotates at HALF the line shaft speed yet gives DOUBLE the power.

It breaks the tightest joints with ease and without damage to tongs, tong dies, or other equipment.

A positive kick-out and slow motion insures greater safety. The positive kick-out permits one revolution, and only one, per pull. Consequently, there is no danger of fouled lines injuring workmen or damaging rig equipment when you use the MacClatchie Gearomatic Cathead.

MacCLATCHIE MANUFACTURING CO.

COMPTON, CALIF. HOUSTON, TEXAS

Export:
Geo. R. Woods, 17 Battery Pl., New York

Lufkin Foundry Completes Two-year Expansion Program

The Lufkin Foundry and Machine Company, Lufkin, Texas, announces the completion of a two-year expansion program that increases the production of its plant more than 125 percent. This company, organized in 1900, has attained world-wide distribution of its pumping equipment.

The expansion program included new buildings and particularly new tools, the plant being practically 100 percent re-tooled and having most modern precision production machines. It is said this plant has the largest and most modern gear cutting department in the world.

Reduction gear units, principal product of the Lufkin Foundry and Machine Company, met with acceptance from their introduction almost 15 years ago, and have since become standard equipment for efficient oil-well pumping, officials of the company state.

Many patents covering oil-field appliances, such as the Lufkin-Trout Counterbalance Crank, are controlled by W. C. Trout, president of the company.

Offices and warehouses are maintained in principal oil fields throughout the United States. Export offices are in New York.

Jarecki Announces New Store at Electra, Texas

The Jarecki Manufacturing Company announces the recent opening of its new supply store at Electra, Texas. Jack Cargile is store manager, and Paul Carpenter is sales representative.

The new Jarecki store is fully stocked with a complete line of oil-field supplies, including the Jarecki-manufactured line of valves, pipe fittings, and oil-field specialties.

Jarecki now operates 34 supply stores, situated at all principal points in the Mid-Continent, northern, and eastern fields. The company has its home office and factory at Erie, Pennsylvania, and its general offices at St. Louis, Missouri.

Acme Oil Tool Company New Oklahoma City Firm

W. E. Bendeler, former sales manager for Baash-Ross Tool Company in the Mid-Continent, and Cliff Howard, former shop superintendent at Oklahoma City for the same organization, have established a business of their own at Oklahoma City, known as the Acme Oil Tool Company. S. W. Florentin, who has been connected with the Hughes Tool Company and Baash-Ross Tool Company for the last four years, has been made mechanical engineer for the Acme Oil Tool Company.

According to Bendeler, the new company proposes to manufacture a general

No. 2C JENSEN Unit. Sampson post only 36" high—but it gets the job done!

JENSEN BROTHERS MANUFACTURING CO.
. . . *Coffeyville, Kansas*

SHALLOW PUMPERS? SURE!

Wells don't come too deep — and they don't come too shallow for you to save money with a JENSEN Pumping Unit.

All over the country these JENSEN Jacks rock along faithfully year in and year out. They demand little attention except lubrication at long intervals.

Of course you're satisfied with the equipment you're using — but would you be satisfied if you knew about the efficiency and economy records made by JENSEN Jacks? Why not write us us now at Coffeyville?

W. G. (BILL) HANRAHAN
Pipe Line Contractor
Thirty Years Experience
BUILDING » RECONDITIONING » AND RECLAIMING
Oil, Gas and Gasoline Lines
Modern Equipment for Every Need
and
Responsible Workmen for Every Deed
5500 Holmes Street Phone 4-6938
DALLAS, TEXAS

line of oil tools, including fishing tools, rotary jars, safety joints, overshots, heat-treated subs, and rotary drill collars, and to maintain a general repair service. Drill pipe and casing cutting will be included in their service.

Bendeler also adds that all manufactured products will be sold through supply stores.

Wm. Woelflin Made District Manager for Petreco

Petroleum Rectifying Company of California announces the appointment of William Woelflin as California District manager having headquarters at the company's offices in Long Beach, California.

WM. WOELFLIN

Woelflin has been with Petreco for 12 years, serving in various phases of the company's research and development activities as research engineer in the Petreco laboratory at Long Beach, and the last two years as California district engineer.

Woelflin is well known to the oil refining industry through his comprehensive series of technical articles that have appeared in the "Electric Dehydrator" and other oil publications.

A graduate of the University of Cincinnati with the degree of chemical engineer; and a member of Tau Beta Pi, honorary engineering society, Woelflin entered the oil business on leaving school and since has had considerable experience in both the production and refining departments.

Union Wire Rope Corporation Elects Officers and Directors

The annual meeting of the stockholders of the Union Wire Rope Corporation, of Kansas City, Missouri, was held at Kansas City, Missouri, on Tuesday, March 22nd. All directors were re-elected, and officers were elected as follows:

Chairman of board, R. H. Bartlett, Tulsa; president and general manager, M. G. Ensinger, Kansas City; vice-president and treasurer, J. H. Hatch, Kansas City; vice-president and general sales manager, L. G. Schraub, Kansas City; vice-president and manager of oil-country sales, H. R. Gruber, Tulsa; secretary and assistant treasurer, J. C. Soll, Kansas City; chief engineer and assistant treasurer, Walter Voigtlander, Kansas City; assistant secretary and assistant treasurer, H. W. Lawrence, Tulsa.

A. Arutunoff Heads Reda Pump Company

A. Arutunoff was elected president of the Reda Pump Company, Bartlesville, Oklahoma, at the annual stockholders meeting recently. S. C. Beesley was elected first vice-president and treasurer and P. E. Loye was chosen second vice-president and sales manager. Reed Crites was elected secretary, Homer Morgan, assistant treasurer, and Dwight Fries, assistant secretary.

The following were elected to the board of directors: A. Arutunoff, H. E. Koopman, J. L. Overlees, Joe Crow, and S. C. Beesley of Bartlesville; Clyde Alexander, Dallas, Texas, and Walter Miller, Ponca City, Oklahoma.

At the first meeting of the board of directors, held following the stockholders' meeting, a dividend of 15 cents per share of common stock was declared. The dividend was payable April 5, to stockholders of record on April 1.

See the New Laminated

NO-OX-ID-IZED DIELECTRIC WRAPPER

•

See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY. 14-21

Booth Nos. 106-107

•

At our booths we will have on display coated pipe which will show the new types of laminated NO-OX-ID-IZED Dielectric Wrapper, improvements over present types of Wrappers. Increased dielectric strength. Retarded bacterial action. Other interesting developments at hand.

DEARBORN CHEMICAL COMPANY

Represented by:

E. M. CONVERSE — C. C. RAUSCH
I. L. YETMAN — C. B. SMITH
B. E. CONLEY — G. M. MASSEN
TED KITTREDGE

Headquarters: MAYO HOTEL

205 East 42nd Street NEW YORK — 310 S. Michigan Ave. CHICAGO — 807 Mateo Street LOS ANGELES

Three New Continental Supply Stores

Announcement of the opening of three additional branch stores has been made by the Continental Supply Company, Dallas, Texas.

Illinois operators will be served by an outlet to be established at Centralia, Illinois, under the direction of F. W. George. This store will be in addition to the recently-opened facilities at Flora, Illinois.

A new store at Houma, Louisiana, with Thomas J. Holmes, jr., as store manager, will facilitate the serving of Louisiana Gulf Coast operators. Holmes, who formerly was store manager at New Iberia, is succeeded by J. A. French at that point.

A new store will be opened immediately at Seagraves, Texas, under the managership of James C. Hill. This is another Continental outlet serving West Texas.

Marley Company in New Building

The Marley Company is now occupying its new warehouse and office building recently completed in the Fairfax industrial district of Kansas City, Kansas. Friends of the company are being cordially invited to inspect the new quarters.

OTIS PRESSURE CONTROL, INC.

Cordially invites you

to visit the Otis exhibit at the International Petroleum Exposition, Tulsa, May 14-21, Booths 224-225, Oklahoma Building.

WE WILL DISPLAY THE FOLLOWING EQUIPMENT

1. Otis Square Kelly Drilling Head and Pressure Operated Union for drilling in under pressure control.
2. Otis Snubbing Equipment for the running and pulling of pipe under pressure.
3. Otis Removable Bottom Hole Chokes.
4. Otis Mixing Valve.
5. Otis Tubing Safety Valve.
6. Otis Tubing Closing Tool.
7. Otis Tubing, Drill Stem and Casing Plugs.
8. Otis Paraffine Scraper.

●

Tower Petroleum Building

DALLAS, TEXAS

Houston, Texas	Glendale, Calif.	Oklahoma City, Okla.
Kermit, Texas	Wellsville, N. Y.	Ada, Okla.
Wichita Falls, Texas	Rodessa, La.	Hobbs, N. M.

I.P.A.A. Committees to Meet

It has been announced from the national headquarters of the Independent Petroleum Association of America that three of the most important committees of the association will meet at the Allis Hotel in Wichita, Kansas, on Thursday, April 28, which is a day prior to the meeting of the Interstate Oil Compact Commission.

The association's sub-committee on unnecessary and unprofitable drilling, under the chairmanship of R. A. King of the King Oil Company, Wichita Falls, Texas, will meet, it was stated, at 9:30 a. m. This sub-committee will give careful consideration to conditions that have developed, and are developing, as a result of unnecessary drilling.

At 10:30 a. m. the committee on balance of supply with demand, under the chairmanship of H. B. Fell, executive vice-president of the association, will hold its meeting to consider the existing statistical position of the industry and matters pertaining to the prevention of waste accomplished through a proper balance of supply with demand.

The executive committee of the association will hold its regular quarterly meeting at 1:00 p. m. at which time it will consider all matters pertaining to the work of the association and the carrying out of the association's program, receiving, while it is in session, such recommendations as the committee on balance of supply with demand and its sub-committee on unnecessary and unprofitable drilling may make.

F. F. Carr Promoted

The Chemical Process Company, Breckenridge, Texas, has promoted F. F. Carr, formerly in the field service at Odessa, Texas, to district manager at Shreveport, Louisiana. Carr has been in the service of the company for several years since graduating from the Colorado School of Mines.

W. K. Mellon on Trip

W. K. Mellon, vice-president of Petroleum Rectifying Company of California, left Los Angeles April 9 for an extended business trip that will take him through various oil-producing areas of the country. He expects to spend several weeks at the company's branch in Houston, Texas, before continuing on through the Mid-Continent and Great Lakes sections, and to a number of eastern cities on a tour of inspection of Petreco Electromatic De-Salting Plants.

Modern Production Methods to Be Featured at Natural Gas Convention

The various programs of the Production Section of the Natural Gas Department, American Gas Association, during the annual convention in New Orleans, May 9, 10, 11, and 12, 1938, should be of unusual interest. W. Jennings Young, vice-president of the Oklahoma Natural Gas Company, Tulsa, Oklahoma, who is chairman of the Natural Gas Production Committee for the A. G. A., will preside at all meetings, and outstanding authorities will deliver papers on many phases of gas production conservation.

Among the subjects and speakers to be presented are: Hugh M. Stalcup, vice-president, Skelly Oil Company, who will speak on "What the Oil Industry is Doing About Conservation;" L. B. Denning, president, Lone Star Gas Company, Dallas, Texas, whose subject will be "The Problems of Conservation;" "Properties of Fluids Under High Pressure Reservoirs Producing Small Amounts of High Gravity Liquid," by Kenneth Eilerts, U. S. Bureau of Mines, Bartlesville, Oklahoma; "Latest Ideas on Availability of Gas Reserves and Well Spacing," D. T. MacRoberts, United Gas Pipe Line Company, Houston, Texas; "Utilization of Natural Gas From Oil Field Operations in California," H. P. George, Southern California Gas Company, Los Angeles, California; "Acidizing Gas Wells and Shooting To Increase Production," a paper to be presented by M. E. Chapman, Tulsa, Oklahoma, and discussed by Robert Garrett, Arkansas Natural Gas Company, Shreveport, Louisiana; "Pooling of Royalty Interests Under Gas Producing Areas," by J. French Robinson, Peoples Natural Gas Company, Pittsburgh, Pennsylvania; and many other timely and interesting subjects, some of which are being presented to the industry for the first time.

Bovaird Opens Store in K. M. A. Field

JAMES P. TUNE

The Bovaird Supply Company opened on April 1 a new store at Kadane Corner, in the K. M. A. field. James P. Tune is the manager of the store and Fletcher V. Strong is the assistant manager. Tune formerly was field salesman at Bovaird's Oklahoma City store and Strong field salesman at the Ada store.

Reda Pump Opens Houston Branch

F. REES FLINT

The Reda Pump Company of Bartlesville, Oklahoma, announces the opening of a sales office in Houston, Texas, at 1411 Second National Bank Building. This new office will be in charge of F. Rees Flint who has been associated with the company in the service department since 1934. Before that time he was with the Phillips Petroleum Company.

More and Cleaner Pipe Cuts per cutter blade with the RIDGID Cutter

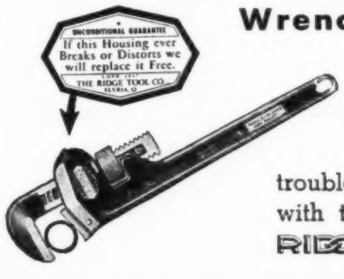
Your experience with pipe tools makes it easy for you to see at once why this patented RIDGID Cutter saves you money on cutter wheels and gives you far cleaner cuts.

For the RIDGID Wheel has a thin blade coined from special rolled alloy tool steel, hammered and heat-treated to give it extra guts, then assembled in a solid hub. It rolls right through any pipe, quickly, easily, leaving practically no burr. Far more cuts per wheel, saves you bother and expense of replacement.

Cutter housing reinforced, strong and true-cutting. A tool you enjoy owning and using. Hundreds of thousands in use. Try one at your Supply House. For better cutting and economy, buy the RIDGID Cutter.

The Ridge Tool Co., Elyria, Ohio

Save 75% of Your Pipe Wrench Repairs

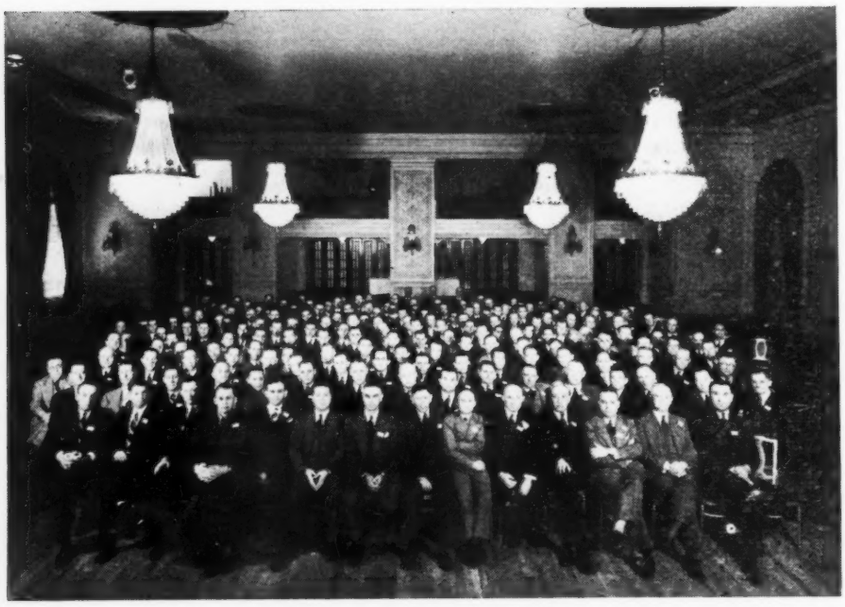


Millions of users have found that they actually do save nearly all wrench trouble and repair expense with the powerful all-alloy RIDGID.

RIDGID PIPE TOOLS

Stop in and visit our Booths Nos. 28-29-30, in the Texas Bldg., at the Oil Show, Tulsa, Oklahoma, May 14-21.

Continental Supply Company Holds Sales Meeting



More than 200 representatives of The Continental Supply Company and associated firms met March 21st and 22nd in Dallas, Texas, for a two-day sales meeting.

Presiding over the conference was Frank Purnell, president of Continental's parent organization, The Youngstown Sheet and Tube Company, and also W. J. Morris, president, The Continental Supply Company.

New Jobber

Republic Steel Corporation, Cleveland, Ohio, announce the appointment of W. B. Young Supply Company, Kansas City, Missouri, as jobber for Republic's tubular products. The firm, organized 54 years ago, has branches in Hutchinson, Kansas, and Joplin, Missouri.

Alex S. Feild Joins Reed Roller Bit Company

Reed Roller Bit Company, Houston, Texas, announces the appointment of Alex S. Feild as manager of the Air-Balanced Pumping Unit Division. After receiving his degree at the University of Cincinnati, Feild served four years with the Standard Oil Company of Louisiana as construction engineer and farm boss. At the end of this period, he accepted a position with the Shell Petroleum Corporation as chief mechanical engineer of the central division and development superintendent in West Texas, then for two years was assistant sales manager of Naylor Pipe Company, and two years chief petroleum engineer with the Vacuum Oil Company.

ALEX S. FEILD

Before joining the Reed organization, Feild was connected with the U. S. Rubber Company, and is well known in the industry. His headquarters will be in Houston.

ARMSTRONG BROS.

Dependable PIPE TOOLS

Certain to pay-out

There's no purpose in "wild-catting" on pipe tools when by specifying "ARMSTRONG BROS." you get tongs of proven strength and pipe tools with drop forged, hardened and alloy steel parts wherever they will add to strength or wearing quality. Each is an improved tool certain to pay out. Chains of ARMSTRONG BROS. Tongs are proof-tested to two-thirds of catalog strength (from 3,600 to 40,000 lb.) Jaws are drop forged from special steel, are treated, hardened and tested for wearing qualities, have forged-in lugs that give greater bearing on the bar, drop forged shackles and hardened steel bolts. Design improvement prevents chains from jamming.

ARMSTRONG BROS. Pipe Tools, *the most complete line manufactured, include:*

PIPE TOOLS
Solid Stocks and Dies
Adjustable Stocks and Dies
Receding Threaders and Chasers
Pipe Cutters and Wheels
Hinged and Chain Pipe Vises
Pipe Reamers
Pipe Wrenches

ARMSTRONG BROS. TOOL COMPANY

"The Tool Holder People"

Eastern Warehouse and Sales: 199 Lafayette Street, New York, N. Y.
331 North Francisco Avenue, Chicago, U. S. A.

ARMSTRONG BROS. TOOL COMPANY

331 N. FRANCISCO AVE. CHICAGO, U. S. A.

Chiksan Opens Gulf Coast Office

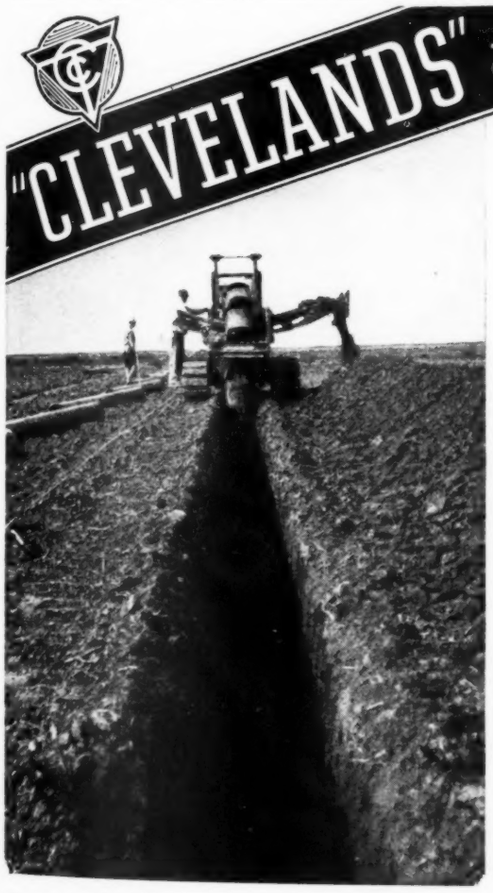
Chiksan Oil Tool Company, Ltd., Fullerton, California, has opened an office in the Shell Building, Houston, Texas, P. O. Box 2144. Herb Maland, who has been Chiksan's chief engineer for a number of years, is in charge of the new office. Thorough knowledge of the Chiksan line and wide engineering experience enable him to make valuable recommendations for individual swing joint problems. He will devote the major portion of his time to promoting the use of Chiksan joints for boats, docks, refineries, loading racks, and other low-pressure swing joint installations.

Made Distributor Water Softeners

The W-K-M Company, Inc., Houston, Texas, is now exclusive distributor for the complete line of oil-field water softeners manufactured by the Continental Chemical Company of Sand Springs, Oklahoma. The Zeolite method of softening water has ben adopted by many operators, both on steam-drilling rigs and on gas-, gasoline-, or Diesel-powered rigs, it is stated. W-K-M offers four models of Continental softeners for steam rigs and five models for internal combustion engines.

Schlumberger's New Tyler, Texas, Office Building

Schlumberger Well Surveying Corporation's East Texas Division recently moved into the new district headquarter office pictured here, on North Dixie Street, Tyler, Texas. The Schlumberger truck depot, adjacent to the new office building, houses and keeps in first class condition, the many Schlumberger service units that cover this territory. The new office building is entirely modern, including air-conditioning. Men in the picture, left to right, are: W. J. Lytle, engineer; R. T. Wade, district manager; and C. A. Doh, engineer, Tyler branch.



GO ANYWHERE ANYTIME and **DIG**

Most **"machine-ditch" at least cost.** That's what you get, with "CLEVELANDS."

Compact, fast, flexible—easy to move around the country—"CLEVELANDS" are built to endure. The toughest, hardest materials are used, without restriction as to cost, enabling you to save money and get more work done.

"CLEVELANDS" are driving this story home, out on the line, every day. Proof, on your **own** work is yours for the asking. Write or wire **today,** or

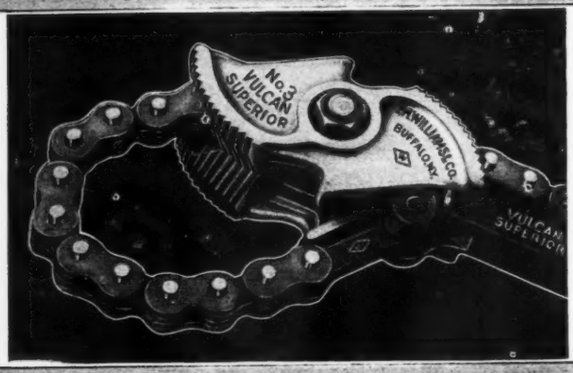
Meet us at Block P, International Petroleum Exposition; Tulsa, May 14th-21st.

THE CLEVELAND TRENCHER COMPANY

20100 St. Clair Ave. **Cleveland, Ohio**

"VULCAN SUPERIOR"

Provides



Double

LIFE-SERVICE-VALUE

Williams' "Vulcan Superior" Tongs give you double value because they actually give you double life and double service.

"Vulcan Superior" is a universal service tong for both pipe and fittings—TWO tools in one. You can switch from one to the other *instantly*—no parts to change, no adjustments to make. The "V" recess in the jaws (which are reversible for double life) assures quick and positive grip on fittings.

Seven sizes, with either flat link or cable chain; handle pipe and fittings from 1/8 to 12 inches. Fully guaranteed. And remember, Extra Flat Chains for all four patterns of Williams' "Vulcan" Tongs are interchangeable, size for size, simplifying replacements . . . an exclusive Williams' feature.

Buy from your Distributor

J. H. WILLIAMS & CO.

261 Spring St., New York

Headquarters for: Drop-Forged Wrenches (Carbon and Alloy), Detachable Socket Wrenches, Reversible Ratchet Wrenches, "C" Clamps, Lathe Dogs, Tool Holders, Eye Bolts, Hoist Hooks, Thumb Nuts and Screws, Chain Pipe Tongs and Vises, etc.

***Western Warehouse and Sales Office:* Chicago**
***Works:* Buffalo, N. Y.**

WILLIAMS
SUPERIOR DROP-FORGED TOOLS

Jones and Laughlin Make Personnel Changes

R. T. ROWLES

The appointment of three assistant general managers of sales, the opening of a new district sales office in Baltimore, together with several promotions and new appointments in the corporation's district sales offices, effective April 1st, were announced recently by Lewis M. Parsons, vice-president and general manager of sales of the Jones and Laughlin Steel Corporation, Pittsburgh, Pennsylvania.

The three assistant general managers of sales are R. T. Rowles, W. H. Wiewel, and H. J. Watt; the two former having general supervision over products sales departments and the latter over eastern district sales offices. Rowles will supervise the general activities of the hot-rolled, cold-finished, wire products, and warehouse sales departments.

W. H. WIEWEL

Wiewel will supervise the general activities of by-products and pig iron, sheets and strip, tinplate, and tubular products sales departments.

Watt will have charge of New York City and the East, with general supervision over district sales offices in Boston, New York, Philadelphia, Atlanta, and the new district sales office in Baltimore. Watt has been district sales manager in New York since 1935.

Arthur A. Wagner, assistant manager of hot-rolled sales, becomes manager of hot-rolled sales, succeeding Rowles.

John O'H. Anderson, assistant district sales manager in New York City, becomes manager of sales, tubular products, succeeding Wiewel. E. J. Dickson becomes assistant manager of sales, tubular products, in Pittsburgh.

The new district sales office in Baltimore will be in charge of V. A. Jevon, as district sales manager, and H. R. Dorney, as assistant district sales manager.

John B. DeWolf is appointed district sales manager in Philadelphia, succeeding Thomas C. Ham, who is transferred to Pittsburgh to supervise the corporation's industrial training plan. Herbert B. Spackman is made assistant district sales manager at Philadelphia.

Edward H. Hughes is made district sales manager at St. Louis, succeeding J. B. Hungate, who resigned.

Two new assistant district sales managers have been appointed in New York, under Watt; William K. Breeze, transferred from the Cincinnati office and Hughart R. Laughlin, at present in the New York office.

H. J. WATT

F. B. Kittredge has been promoted from the Philadelphia office to assistant district sales manager at Boston under Samuel A. Fuller, district sales manager.

Charles M. Mason has been promoted from the Cleveland office to assistant district sales manager at Buffalo, under Charles F. Gold district manager of sales.

N. G. A. A. Convention Again Features Kinks Session

The seventeenth annual convention of the Natural Gasoline Association of America, scheduled for May 11, 12, and 13, 1938, at the Hotel Tulsa, Tulsa, Oklahoma, will again feature the "Operating Kinks" session for field and laboratory men of the natural gasoline industry, according to a recent announcement of J. W. Vaiden, Skelly Oil Company, chairman of the program committee.

This will be the third consecutive year for this program feature, which was originally an experiment, and is continued because of the broad response of operating men. Entries at the 1937 convention more than doubled the number presented the previous year and for this reason the program committee voted unanimously to reserve the entire morning of May 13 for these interesting discussions.

As at its initial presentation, this session will take the form of a prize contest in which field men will compete, presenting their original ideas for solving production and operating problems in or about natural gasoline plants. Eight prizes, totaling $125.00, will be given to the winners of first and second places in the four classifications into which the contest is divided.

The "Operating Kinks" session will be an informal round-table discussion at which the field man may present his own ideas for improving or simplifying any operation connected with the manufacture of natural gasoline. It is to be an opportunity for public expression of the many valuable ideas developed by the men in the operating end of the industry. These ideas can be exchanged, criticized, and discussed at the session and prizes will be awarded by a committee of gasoline plant operators. The first and second prizes in each of four classifications will be $15 and $10, respectively, and a grand prize of $25 will be awarded for the most practical and valuable idea of all classes. F. E. Fisher, Skelly Oil Company, is chairman of the session and awards committee.

Protect your Engines and Air Compressors with

AIR-MAZE AIR FILTERS

You can't escape dust and grit in Oil Field operations — but you *can* avoid the damage these twin-plagues cause to inadequately protected equipment. Be sure the air filter you select gives you *complete protection.* Only Air-Maze air filters have the famous Air-Maze filter element that incorporates *exact progressive density* with *circumferential design.* This means no clogging, unusually low pressure drop, and longer periods of use before servicing is required. Get the facts about Air-Maze before you buy *any* air filter. Write today for Bulletin NIND-37.

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1. 99.83% efficiency.
2. Less than 1.5" H_2O Pressure Drop.
3. Cannot clog.
4. Automatic operation.
5. Larger element area.
6. Simple installation and servicing.

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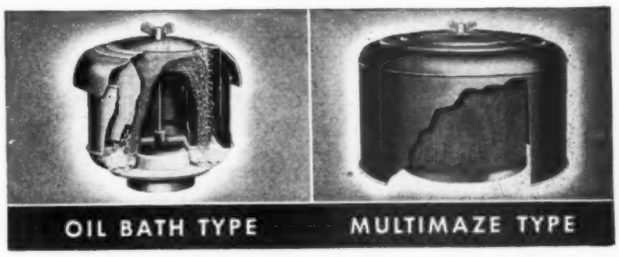


How to Whip

SAND TROUBLES

SPECIFY AND USE

B-M-W Tex Type

WORKING VALVES

Ideal for Common Barrels. For insert pumps use Tex Type Plunger Fittings.
The many Composition Rings shown are separated by metal washers.
In effect it is a grooved seal plunger, made from rubber and fabric, which readily adapts itself to the tube in which it works.

More Fluid Is Handled

1. No appreciable slippage.
2. Very little frictional drag.
3. Exceptionally long runs are obtained because this valve can "take it."

WHO SELLS THEM?

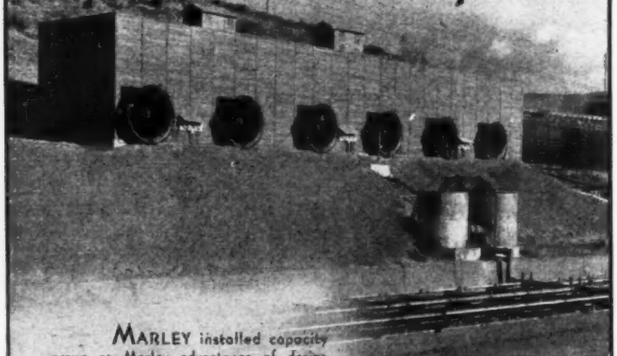
Leading B-M-W Products are obtainable at supply stores: ● TEX TYPE Plunger Fittings and Valves; ● ADMORE Insert Pump Anchors; ● NEILSON Tools (Safety Sucker Rod Hooks, Tubing Hooks, Rod Elevators, Sucker Rod Sockets, etc.); ● BALLS and SEATS (made for every pumping service); ● ADMORE Liner Barrels; and ● COLLINS Belt Clamps.

BRADFORD MOTOR WORKS INC

OIL WELL SUPPLIES

BRADFORD, PA. — TULSA - OKLA.

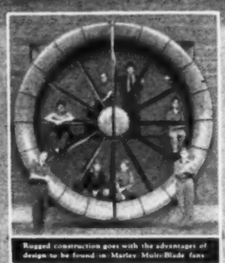
More Than One Million G.P.M. Capacity Installed During 1937



MARLEY installed capacity grows as Marley advantages of design and performance become more widely recognized. In 1937 alone, this capacity increased more than one million gallons per minute.

The new Marley building just completed in the Fairfax district of Kansas City, Kansas, provides facilities for still further expansion and better service.

Careful buyers, write . . .



Rugged construction goes with the advantages of design to be found in Marley Multi-Blade fans

THE MARLEY COMPANY
3000 FAIRFAX ROAD • KANSAS CITY, KANS.
NOTE OUR NEW ADDRESS

MARLEY

WATER COOLING SYSTEMS

The convention program committee consisting of J. W. Vaiden, Skelly Oil Company, Tulsa, chairman; R. C. Alden, Phillips Petroleum Company, Bartlesville; W. A. Baden, Warren Petroleum Corporation, Tulsa; R. E. Beckley, Standard Oil Company of California, San Francisco, California; T. R. Goebel, Shell Petroleum Corporation, Tulsa; J. R. Jarvis, Lone Star Gasoline Company, Dallas, Texas; and P. M. Raigorodsky, Glen Rose Gasoline Company, Tulsa, has announced the following rules and regulations for the submission of ideas for the field men's session:

1. Any employee of a natural gasoline manufacturer may submit one or more "operating kink" ideas.

2. Permission of the employer must be obtained before any idea is submitted.

3. Each idea must be submitted in writing and three copies of each must be presented in the form designated on the "operating kink" blanks, which may be procured from the National Gasoline Association of America, 819 Wright Building, Tulsa, Oklahoma.

4. One clear drawing or distinct photograph may be submitted with each kink and whenever possible the association will make slides therefrom.

5. Five minutes time will be allotted to an employee, at the round-table discussion, for the explanation of each of his kinks.

6. The originator of the kink, although urged to do so, need not be present to explain his idea. Any employee of a natural gasoline manufacturer may explain the idea of any other employee of the same concern.

7. Prize awards are to be made by a committee of gasoline plant operators and their decisions will be final.

8. All "operating kink" entries should be in the N.G.A.A. offices by May 1, 1938, in order that the judges may have ample time to study and classify the entries before the meeting date.

9. Any "operating kink" entry may be made within the following classifications: (a) Operation or maintenance of engines, compressors, pumps, turbines, electric motors, electric generators, or boilers. (b) Metering or other volumetric measuring, temperature controlling, pressure controlling, volume controlling, liquid-level controlling, laboratory equipping or operating methods. (c) Gasoline or oil distillation; fractionation; gasoline absorption, condensation or cooling; gasoline or gas treating. (d) Field pipe-line and other field operation and maintenance; gasoline storing; gasoline loading; special tools, labor saving or safety devices; accounting or record keeping methods; or any other phase of natural gasoline manufacture not covered within the preceding classifications.

J. V. Roth to the Mid-Continent

J. V. Roth, manager of the Bakersfield division of the O. P. Yowell Service Company of California, has been transferred to Dallas, Texas, where he is to be general field manager for the Eastman Manufacturing Company. In his new position he will have the responsibility of introducing the Eastman-Yowell perforation washers in the Mid-continent and Gulf Coast districts.

Lane-Wells Purchases Lewis Oil Well Service Company

The purchase of the M. J. Lewis Oil Well Service Company of Houston, Texas, has been announced by Walter Wells, president of the Lane-Wells Company. The M. J. Lewis organization has been connected for years past with the development and perfection of directional drilling appliances in the Mid-Continent and Gulf Coast area. The purchase continues the established Lane-Wells policy of developing a completely-rounded and all-inclusive oil-field service in connection with drilling and production.

According to Wells, purchase included the Lewis Knuckle Joint, and all tools, subs, reamers, and accessory equipment, as well as field trucks and automobiles. The personnel of seven trained field crews will be continued and augmented as conditions warrant. In speaking of the purchase, Wells said, "We feel that the acquisition of the Lewis organization, together with the products which they have established in the field, strengthens our oil-well survey division materially. We are now in position to offer not only magnetic single-shot, inclinometer and orienting surveys, but also directional drilling as well."

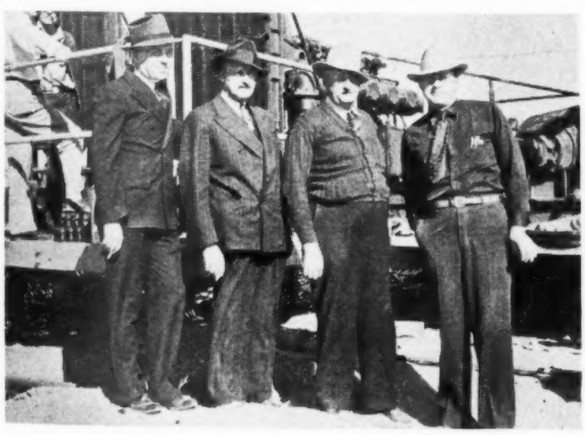
For the time being, all manufacturing will be carried on in the Lane-Wells Company's main plant in Los Angeles. Service and repair plants will be maintained throughout the field to meet conditions as they arise. Lane-Wells Company's headquarters in Texas are at 2002 Wayside Drive, Houston; in the Mid-Continent, at 2 Northwest Tenth Street, Oklahoma City, Oklahoma.

Opens Wichita Falls Branch

Portable Rig Company, Houston, Texas, announces the opening of a branch office at Wichita Falls, Texas, 400 Seventh Street, to serve the K. M. A. and North Texas fields. F. H. Dalling has been appointed branch manager.

Visit West Texas

Several men prominent in the petroleum industry are shown in the accompanying photograph, taken while in West Texas. Reading from left to right they are: Howard



Nesbitt, representative of the Continental Supply Company, Dallas, Texas; J. M. Rush, Dallas; Joe L. Rush, Midland; and Ralph Rush, Hobbs, New Mexico. The Rush brothers are owners of the Trinity Drilling Company and the Midland Drilling Company. They are shown with their Continental HJM rotary drilling rig now running in the Johnson pool, five miles northwest of Odessa, Texas.

DOUBLE-CHECKED

FOR TIGHTNESS

Each of the seven specialized types of Hough Balls and Seats is vacuum-tested to *prove* tightness, and *guaranteed* to be absolutely tight.

FOR HARDNESS

Every Hough heat-treated Seat is checked for hardness by the Rockwell Hardness Testing Machine. You can be *sure* that each hardened seat is uniformly heat-treated.

In stock at your oil-field distributor's.

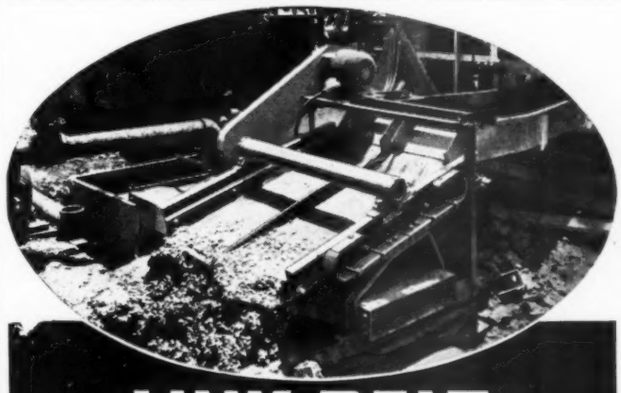
HOUGH *Specialized* BALLS & SEATS

THE CHARLES N. HOUGH MFG. COMPANY

Franklin, Pa., and Tulsa, Okla.

("REPELEX" AND SIX OTHER SPECIALIZED TYPES)

See Our Exhibit, International Petroleum Exposition, Tulsa, May 14-21



LINK-BELT *Vibrating* SCREEN

for Reconditioning Rotary Mud

● The Link-Belt screen has proved by actual performance that it is the lowest cost method of reconditioning rotary mud. It has many exclusive advantages such as—larger screening area—longer life of screen cloth—ease of transportation—minimum head room required, etc. Successfully used in oil fields of the world. Send for Folder No. 1772.

LINK-BELT COMPANY

Philadelphia Los Angeles New York Dallas Houston Tulsa

7322

IMPROVE DIESEL PERFORMANCE

with a Safe, Thorough Oakite Cleaning

YOU know how heavy rust and scale deposits raise the dickens in the cooling jackets of Diesel engines. Lubricating oil consumption goes up. Uneven cooling may cause seizure of pistons, scoring of cylinder linings.

REMOVES SCALE SAFELY

There's no need to put up with this loss in cooling efficiency when you can remove every trace of rust and scale QUICKLY, SAFELY, ECONOMICALLY. Just circulate a solution of Oakite Compound No. 32 through the system. Dissolves the scale so it is readily and completely flushed away.

FREE BOOKLET

A short concise booklet on Oakite Compound No. 32 tells the complete story. Have us send you a free copy of it. No obligation. Write for it today.

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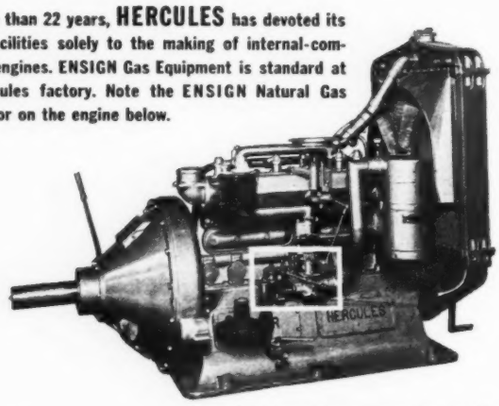
OAKITE *Certified* **CLEANING**
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

LEADING ENGINE BUILDERS CHOOSE **ENSIGN**

For more than 22 years, HERCULES has devoted its entire facilities solely to the making of internal-combustion engines. ENSIGN Gas Equipment is standard at the Hercules factory. Note the ENSIGN Natural Gas Carburetor on the engine below.



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☆ ENSIGN precision products for the efficient, economical carburetion of internal-combustion engines consist of Gas, Combination Gas and Gasoline, and Butane Carburetors of superior principle and design. Standard equipment with a large majority of engine manufacturers, ENSIGN Carburetors have always proved outstanding values. **For the BEST in CARBURETION . . . equip with ENSIGN!**

ENSIGN CARBURETOR CO., LTD.

TRADE LITERATURE

THE LATEST ISSUE of the "Lufkin Line," publication of the Lufkin Foundry and Machine Company, Lufkin, Texas, features the advancement of air transportation during the last ten years and reviews the achievements in safety and comfort made possible by research and experimentation in aviation.

In addition to the story on air transportation, other stories of general interest include "A Recipe for a Radio Show"—which details the entire process of building a modern radio show in which such stars as Lanny Ross, Charlie Butterworth, and Jane Rhodes are the principal characters; "Split Peas Built the Bueltmore"—a story about Auton Anderson who retired from the Cafe Maguery on Park Avenue to become famous as the proprietor of the only hotel in the world built entirely on a foundation of split pea soup.

Many snapshots of prominent personalities in attendance upon the A.P.I. division meeting at Amarillo are included in this issue of the "Lufkin Line" as are also those of individuals in the fields of Oklahoma, Kansas, and East Texas.

The "Lufkin Line" is sent to oil men anywhere upon request.

●

GENERAL ELECTRIC COMPANY, Schenectady, New York, has issued several bulletins describing its equipment, as follows:

GEA-1587C—Combination magnetic switch.
GEA-2635—Strip-chart recording instruments.
GEA-2011A—AP-9 portable electric indicating instruments.
GEA-2473—Push-button stations.
GEA-2776—Gasoline-engine-driven arc welder.
GEA-2704—Arc-welding accessories.
GEA-67E—CR2931 float switches.
GEA-1423A—Solenoid-operated valves.
GEA-1590C—Oil-immersed magnetic switches.

●

THE BROWN INSTRUMENT COMPANY has published a folder entitled: "Jim is Right," explaining how Brown flow meters, by metering steam, water, oil, and other fluids, can bring to manufacturing processes many of the economies they have effected in power production. Copies of this folder will be sent to any one requesting it. Address The Brown Instrument Company, Wayne and Roberts Avenues, Philadelphia, Pennsylvania, and ask for Folder No. 80-36.

●

HUNT TOOL COMPANY, 1945 St. Bernard Street, Houston, Texas, has issued a four-page descriptive folder on the Reagan improved low-pressure gas burner, which is now manufactured and distributed by this company. The many advantages offered by patented features of this burner are explained in this folder, and the burner is well illustrated, showing in particular a close-up view of the patented V-shape gas mantles that spread a blue flame over the entire fire-box.

●

AMERICAN LUBRICATOR COMPANY, First National Bank Building, Dallas, Texas, has off the press a descriptive folder covering details of the new "Standard" force- and sight-feed chemical injector, high-pressure type, for oil-field service. The method of pumping chemical into the oil line automatically, the driving mechanism, the chemical reservoir, and other important points of design and construction are explained in this folder, which is complete with price.

W-K-M Company, Houston, Texas, has issued a catalog describing its complete line of equipment, and another, Bulletin No. 654, devoted entirely to the W-K-M Through-Conduit Lubricated Gate Valve. Both are available upon request.

●

Farrar and Trefts, Inc., Buffalo, New York, have issued a new bulletin on oil-country boilers. It illustrates and describes the company's latest types of boilers with particular emphasis on the fusion-welded barrel, dome, and inside firebox joints, replacing riveted joints. The boilers are distributed by the Continental Supply Company and their export division, Continental Emsco Company.

Republic Steel Opens Large Strip Mill in Cleveland

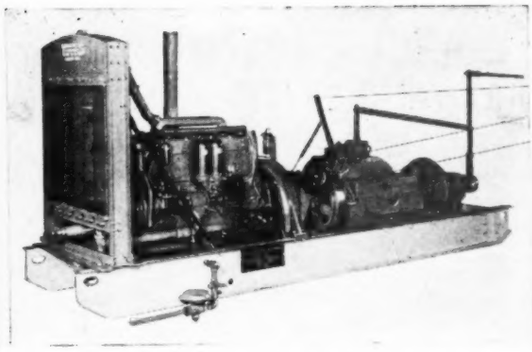
The Republic Steel Corporation recently opened its 98-in. strip mill in Cleveland, Ohio. The new mill embodies in its design every technological improvement that the country's best mechanical, electrical, and metallurgical engineers have thus far developed in the art of processing steel, it is stated. Recent improvements and developments in lubrication, hydraulics, welding, design of bearings, and electrical control, which make possible the production of extra-wide sheet steel at the terrific speeds employed in Republic's new mill, are featured throughout the plant. So, too, are latest advanced factory management practices and technique in the efficient handling of materials, in the metallurgical control of products being processed, in the coördinating of all mill operations, and in the establishment of safe, healthful working conditions for workmen in the plant.

Maximum delivery speed of the hot mill is 2121 ft. per minute. It can roll all finished widths from 30 to 94 in. and all finished thicknesses from 18-gauge strip to ½-in. plate. The plant has a nominal rated capacity of 70,000 gross tons per month.

The mill is situated on a 182-acre site six miles from the mouth of the Cuyahoga River. For a distance of almost half a mile at this point the course of the river was changed to make way for the mill, more than 1,000,000 cu. yd. of dirt being moved in excavating for the new river channel and in filling the old river bed and a nearby swamp. More than 19,000 concrete piles averaging 40 ft. in length were driven into the new fill and 120,000 cu. yd. of concrete were poured to provide a foundation for the superstructure and the heavy mill equipment.

The appearance of the mills is that of two enormous industrial plants. Actually, however, these two structures consist of a total of nine large buildings. In addition, there is an office building with completely equipped testing and metallurgical laboratories in the basement, a welfare building with shower and dressing room accommodations, and a machine shop, a carpenter shop, and a large pump house on the river bank. The plant has a capacity for production of 1,000,000 tons of hot- and cold-rolled sheet and strip per year.

The location of every machine and of every item of equipment in the plant was scientifically worked out after months of intensive study to make its operation and management, even though the massive machinery had to be spread over 21 acres of buildings, as efficient as any large-scale plant ever built. Particular attention was paid to the fast-growing trend throughout the steel industry of making "tailor-made" products, products made to order to meet the particular requirements and specifications of each customer. Despite the fact that the mill is geared to high-speed production of nearly 1,000,000 tons per year, it is designed to turn out smoothly and efficiently relatively small orders of specially processed steel, and there is always a continuous flow of production from unit to unit and from department to department, without any back-tracking or lost motion.



YOUNG ENGINES
Stay on the Job

No need to pamper a Young Drilling Engine. Put it on your toughest job. It will reach "pay sand" fast and at lowest cost per foot. The gas engines may also be operated on Butane.

They are rugged! Built by experienced oil country men who know the punishment drilling engines must take. Use a Young Engine on your next well. See our display at the Tulsa Oil show in May.

Western Representatives: A. E. AVERS, Tulsa, Okla., and IVERSON TOOL COMPANY

YOUNG DRILLING ENGINES
Make Your Drilling Dollars Go Deeper
GAS • GASOLINE • DIESEL

Ask for CATALOG 20 P

YOUNG ENGINE CORP.
CANTON . . . . OHIO

SHULL SAND PUMP
(Self-unloading)

Many of the difficulties encountered in desanding operations are solved by this self-unloading sand pump. Working parts have been reduced to the minimum. Sticking in the casing is eliminated. It has an extra-long bailer tube. Loading and unloading are quickly accomplished and the fluid in the bailer washes the sand chamber clean. Greater strength is obtained by the use of a solid steel plunger instead of the conventional hollow-shaft. High vacuum is maintained in tubing with only an 11-foot stroke of the plunger.

See Composite Catalog or send coupon for full information

REQUEST FOR INFORMATION

Shull Perforating Co., Inc.
2750 Cherry Ave., Long Beach, Calif.

Send full details regarding your new sand pump.
( ) Information about other Shull Products

*Name*_____

*Address*_____

*City*_____ *State*_____

"ON LOCATION"
AND GIVING A SMOOTH PERFORMANCE

This Fulton Low Pressure Regulator is at work on the gas fuel line of a pump drawing oil from a deep well in Oklahoma. It might be in any place where pumping is done and pressure needs to be regulated. Chaplin-Fulton devices for controlling pressures of oil and other liquids, gas, air, or steam have been standard for over fifty years. Ask for catalog.

THE CHAPLIN-FULTON MFG. COMPANY

28-40 Penn Ave.
PITTSBURGH, PA.

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COMFORT AND CONVENIENCE!

Now you may combine the advantages of a luxurious hotel with the convenience of living economically in the very heart of the city.

Air-Conditioned

Rooms, Apartments, Suites . . .
Coffee Shop and Meeting Rooms.

That Friendly Atmosphere!

Hotel TULSA

More efficient, more economical--because they produce a finer, more uniform spray, do not clog and operate effectively under low pressures.
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Trade Personals

BART ALDRIDGE, sales engineer for the Koppers Company, American Hammered Piston Ring Division, Baltimore, Maryland, is making an extended trip through the south and southwestern territories, having visited Savannah, Georgia, New Orleans, Louisiana, Corpus Christi, El Paso, and Dallas, Texas. He will attend the Tulsa Oil Show, returning after its close to headquarters. He was accompanied through Texas by JOE FULLER, representative for the company at Fort Worth.

W. F. KRUEGER, since 1935 a junior engineer on the staff of the U. S. Bureau of Mines at Bartlesville, Oklahoma, joined the staff of the Sperry-Sun Well Surveying Company on April 15. He will have his headquarters at Houston, Texas.

N. D. MORRIS, who has been in the East for The Star Drilling Machine Company, Akron, Ohio, has been transferred to the West Texas territory. D. A. SMITH has been placed in charge at the company's Abilene, Texas, warehouse. He is being transferred from the home office of the company.

T. J. FLOURNOY has been appointed manager in the West Texas district for the Buda Engine and Equipment Company, Houston, Texas. He will make his headquarters at Odessa. The appointment is effective May 1st. Flournoy has been with the Petroleum Equipment Company in California.

DOYLE WILLIAMS has returned to the staff of A. M. Lockett and Company, Dallas, Texas, following a leave of absence during which time he was connected with the McMurrey Refining Company at Tyler, Texas. He is stationed at Odessa in the West Texas area.

E. L. (SALTY) CLARK has been assigned by the Walworth Company, New York City, to take charge of its Shreveport, Louisiana, territory, including lower Arkansas, East Texas, and the Louisiana Gulf Coast. He has been stationed at Houston, Texas.

CY W. SMITH, 4831½ Swiss Avenue, Dallas, Texas, representative of Beaver Pipe Tools, Warren, Ohio, is rapidly recovering from an emergency operation performed on April 2 at St. Paul's Hospital in Dallas.

R. K. MANGAN has been appointed vice-president of The Buda Company, Harvey, Illinois, in charge of advertising, domestic and export sales of Diesel and gasoline engines sold to the automotive, general industrial, marine, stationary and oil-field trade. Mangan has been associated with The Buda Company in an engineering and sales capacity for approximately 20 years.

O. G. BAKER, E. H. FOSTER, C. F. WHALEY, L. K. MARTIN, and W. O. USSERY, members of the sales force, will attend the International Petroleum Exposition at Tulsa for the MacClatchie Manufacturing Company, Compton, California.

W. R. BRADEN, president; JACK MATTHEWS, salesman; J. C. PHARR, salesman; and JACK HENDRICKS, office manager, will represent the Braden Steel Corporation, Tulsa, Oklahoma, at the International Petroleum Exposition. The company manufactures sectional steel buildings for the oil industry.

H. S. STROUSE has been appointed vice-president of the Harnischfeger Corporation, Milwaukee, Wisconsin. He will continue to direct the activities of the treasurer's department of the company, which he has headed for the last seven years.

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See Page 1186 COMPOSITE CATALOG

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THE *Petroleum*

Engineer's

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A DAILY REFERENCE FOR OPERATING MEN

INSTALLMENT NO. 11

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[1]In footnote, "feet" should read "inches."
[2]Headings "Redwood No. 1 seconds" and "Redwood admiralty seconds" should be transposed.

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TOTAL[1] UPWARD PRESSURE AT WELL HEAD BETWEEN DRILL PIPE AND CASING, LB.

Casing diam., O.D., in.	Drill pipe diam., O.D., in.	Well head pressure, lb. per sq. in. gauge																	
		1000	2000	3000	3500	4000	4500	5000	5500	6000	6250	6500	6750	7000	7200	7400	7600	7800	8000
8⅝	2⅜	58,630	117,260	175,890	205,210	234,530	263,840	293,160	322,470	351,790	366,450	381,110	395,760	410,420	422,150	433,870	445,600	457,330	469,050
	2⅞	56,010	112,010	168,020	196,020	224,030	252,030	280,030	308,040	336,040	350,040	364,040	378,040	392,050	403,250	414,450	425,650	436,850	448,050
	3½	52,020	104,040	156,070	182,080	208,090	234,100	260,110	286,120	312,130	325,140	338,140	351,150	364,160	374,560	384,960	395,370	405,770	416,180
	4½	44,020	88,040	132,070	154,080	176,090	198,100	220,110	242,120	264,130	275,140	286,140	297,150	308,160	316,960	325,760	334,570	343,370	352,180
	5⁹⁄₁₆	33,330	66,650	99,980	116,640	133,300	149,960	166,630	183,290	199,950	208,280	216,610	224,950	233,280	239,940	246,610	253,270	259,940	266,600
9	2⅜	63,080	126,170	189,250	220,790	252,330	283,880	315,420	346,960	378,500	394,270	410,040	425,810	441,580	454,200	466,820	479,430	492,050	504,670
	2⅞	60,460	120,920	181,380	211,600	241,830	272,060	302,290	332,520	362,750	377,870	392,980	408,090	423,210	435,300	447,390	459,480	471,580	483,670
	3½	56,470	112,950	169,420	197,660	225,900	254,130	282,370	310,610	338,840	352,960	367,080	381,200	395,320	406,610	417,910	429,200	440,500	451,790
	4½	48,470	96,950	145,420	169,660	193,900	218,130	242,370	266,610	290,840	302,960	315,080	327,200	339,320	349,010	358,710	368,400	378,100	387,790
	5⁹⁄₁₆	37,780	75,550	113,330	132,220	151,110	170,000	188,890	207,770	226,660	236,110	245,550	255,000	264,440	272,000	279,550	287,110	294,660	302,220
	6⅝	24,830	49,670	74,500	86,920	99,330	111,750	124,170	136,580	149,000	155,210	161,420	167,630	173,830	178,800	183,770	188,730	193,700	198,670
9⅝	2⅜	73,940	147,890	221,830	258,800	295,770	332,750	369,720	406,690	443,660	462,150	480,630	499,120	517,610	532,390	547,180	561,970	576,760	591,550
	2⅞	71,320	142,640	213,960	249,620	285,270	320,930	356,590	392,250	427,910	445,740	463,570	481,400	499,230	513,490	527,760	542,020	556,290	570,550
	3½	67,330	134,670	202,000	235,670	269,340	303,000	336,670	370,340	404,010	420,840	437,670	454,510	471,340	484,810	498,270	511,740	525,210	538,670
	4½	59,330	118,670	178,000	207,670	237,340	267,000	296,670	326,340	356,010	370,840	385,670	400,510	415,340	427,210	439,070	450,940	462,810	474,670
	5⁹⁄₁₆	48,640	97,270	145,910	170 230	194,550	218,870	243,190	267,500	291,820	303,980	316,140	328,300	340,460	350,190	359,920	369,640	379,370	389,100
	6⅝	35,690	71,390	107,080	124,930	142,770	160,620	178,470	196,310	214,160	223,090	232,010	240,930	249,860	256,990	264,130	271,270	278,410	285,550
10	2⅜	82,420	164,840	247,260	288,470	329,680	370,880	412,090	453,300	494,510	515,120	535,720	556,330	576,930	593,420	609,900	626,380	642,870	659,350
	2⅞	79,790	159,590	239,380	279,280	319,180	359,070	398,970	438,870	478,760	498,710	518,660	538,610	558,560	574,520	590,470	606,430	622,390	638,350
	3½	75,810	151,620	227,430	265,330	303,240	341,140	379,050	416,950	454,860	473,810	492,760	511,710	530,670	545,830	560,990	576,150	591,310	606,480
	4½	67,810	135,620	203,430	237,330	271,240	305,140	339,050	372,950	406,860	423,810	440,760	457,710	474,670	488,230	501,790	515,350	528,910	542,480
	5⁹⁄₁₆	57,110	114,220	171,340	199,890	228,450	257,010	285,560	314,120	342,670	356,950	371,230	385,510	399,790	411,210	422,630	434,050	445,480	456,900
	6⅝	44,170	88,340	132,510	154,590	176,680	198,760	220,840	242,930	265,010	276,060	287,100	298,140	309,180	318,020	326,850	335,680	344,520	353,350
	7⅝	29,920	59,840	89,760	104,720	119,680	134,630	149,590	164,550	179,510	186,990	194,470	201,950	209,430	215,420	221,400	227,380	233,370	239,350
10¾	2⅜	95,360	190,720	286,090	333,770	381,450	429,130	476,810	524,490	572,170	596,010	619,850	643,690	667,530	686,610	705,680	724,750	743,820	762,900
	2⅞	92,740	185,470	278,210	324,580	370,950	417,320	463,680	510,050	556,420	579,610	602,790	625,970	649,160	667,710	686,250	704,800	723,350	741,900
	3½	88,750	177,510	266,260	310,630	355,010	399,390	443,760	488,140	532,520	554,700	576,890	599,080	621,270	639,020	656,770	674,520	692,270	710,020
	4½	80,750	161,510	242,260	282,630	323,010	363,390	403,760	444,140	484,520	504,700	524,890	545,080	565,270	581,420	597,570	613,720	629,870	646,020
	5⁹⁄₁₆	70,060	140,110	210,170	245,190	280,220	315,250	350,280	385,310	420,330	437,850	455,360	472,870	490,390	504,400	518,410	532,420	546,430	560,440
	6⅝	57,110	114,220	171,340	199,890	228,450	257,000	285,560	314,120	342,670	356,950	371,230	385,510	399,780	411,210	422,630	434,050	445,470	456,900
	7⅝	42,860	85,720	128,590	150,020	171,450	192,880	214,310	235,740	257,170	267,890	278,600	289,320	300,030	308,610	317,180	325,750	334,320	342,900
11¾	2⅜	115,360	230,720	346,080	403,760	461,440	519,120	576,800	634,480	692,160	721,000	749,840	778,680	807,520	830,590	853,660	876,730	899,800	922,880
	2⅞	112,730	225,470	338,200	394,570	450,940	507,300	563,670	620,040	676,410	704,590	732,770	760,960	789,140	811,690	834,230	856,780	879,330	901,880
	3½	108,750	217,500	326,250	380,630	435,000	489,380	543,750	598,130	652,500	679,690	706,880	734,060	761,250	783,000	804,750	826,500	848,250	870,000
	4½	100,750	201,500	302,250	352,630	403,000	453,380	503,750	554,130	604,500	629,690	654,880	680,060	705,250	725,400	745,550	765,700	785,850	806,000
	5⁹⁄₁₆	90,050	180,110	270,160	315,190	360,210	405,240	450,270	495,290	540,320	562,830	585,340	607,860	630,370	648,380	666,390	684,400	702,410	720,420
	6⅝	77,110	154,220	231,330	269,880	308,440	346,990	385,550	424,100	462,660	481,930	501,210	520,490	539,770	555,190	570,610	586,030	601,450	616,880
	7⅝	62,860	125,720	188,580	220,010	251,440	282,870	314,300	345,730	377,160	392,870	408,590	424,300	440,020	452,590	465,160	477,730	490,300	502,880
	8⅝	46,610	93,220	139,830	163,130	186,440	209,740	233,050	256,350	279,660	291,310	302,960	314,610	326,270	335,590	344,910	354,230	363,550	372,880

The fact that total well head pressures for unit pressures as high as 8000 lb. per sq. in. are included in the table should not be interpreted as indicating that the casing will have sufficient bursting strength to withstand such pressure. For bursting strength of casing see Table P432.2, p. 257, August, 1937, issue.

[1]Total for lightest weight casing, hence a maximum for each size casing.

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CLEARANCE BETWEEN CASING STRINGS, IN.

Size of outer string,		Size of inner string, O. D., in.																						
O.D., in.	I.D., in.	4¾	5	5½	5¾	6	6⅝	7	7⅝	8	8⅛	8⅝	9	9⅝	10	10¾	11¾	12	13	13⅜	14	16	18⅝	20	21½
10	9.384	2.317	2.192	1.942	1.817	1.692	1.379	1.192	.879	.692	.629														
10¾	10.050	2.650	2.525	2.275	2.150	2.025	1.712	1.525	1.212	1.025	.962	.712	.525												
	9.950	2.600	2.475	2.225	2.100	1.975	1.662	1.475	1.162	.975	.912	.662													
	9.850	2.550	2.425	2.175	2.050	1.925	1.612	1.425	1.112	.925	.862	.612													
	9.760	2.505	2.380	2.130	2.005	1.880	1.567	1.380	1.067	.880	.817	.567													
11¾	11.000	3.125	3.000	2.750	2.625	2.500	2.187	2.000	1.687	1.500	1.437	1.187	1.000	.687											
	10.880	3.065	2.940	2.690	2.565	2.440	2.127	1.940	1.627	1.440	1.377	1.127	.940	.627											
	10.772	3.011	2.886	2.636	2.511	2.386	2.073	1.886	1.573	1.386	1.323	1.073	.886	.573											
12	11.384	3.317	3.192	2.942	2.817	2.692	2.379	2.192	1.879	1.692	1.629	1.379	1.192	.879	.692										
13	12.438	3.844	3.719	3.469	3.344	3.219	2.906	2.719	2.406	2.219	2.156	1.906	1.719	1.406	1.219	.844									
	12.360	3.805	3.680	3.430	3.305	3.180	2.867	2.680	2.367	2.180	2.117	1.867	1.680	1.367	1.180	.805									
	12.282	3.766	3.641	3.391	3.266	3.141	2.828	2.641	2.328	2.141	2.073	1.828	1.641	1.328	1.141	.766									
	12.220	3.735	3.610	3.360	3.235	3.110	2.797	2.610	2.297	2.110	2.047	1.797	1.610	1.297	1.110	.735									
13⅜	12.715	3.982	3.857	3.607	3.482	3.357	3.045	2.857	2.545	2.357	2.295	2.045	1.857	1.545	1.357	.982									
	12.615	3.932	3.807	3.557	3.432	3.307	2.995	2.807	2.495	2.307	2.245	1.995	1.807	1.495	1.307	.932									
	12.515	3.882	3.757	3.507	3.382	3.257	2.945	2.757	2.445	2.257	2.195	1.945	1.757	1.445	1.257	.882									
	12.415	3.832	3.707	3.457	3.332	3.207	2.895	2.707	2.395	2.207	2.145	1.895	1.707	1.395	1.207	.832									
14	13.344	4.297	4.172	3.922	3.797	3.672	3.359	3.172	2.857	2.672	2.609	2.359	2.172	1.859	1.672	1.297	.797	.672							
16	15.375	5.312	5.187	4.937	4.812	4.687	4.375	4.187	3.875	3.687	3.625	3.375	3.187	2.875	2.687	2.312	1.812	1.687	1.187	1.000	.687				
	15.250	5.250	5.125	4.875	4.750	4.625	4.312	4.125	3.812	3.625	3.562	3.312	3.125	2.812	2.625	2.250	1.750	1.625	1.125	.937	.625				
	15.198	5.224	5.099	4.849	4.724	4.599	4.286	4.099	3.786	3.599	3.536	3.286	3.099	2.786	2.599	2.224	1.724	1.599	1.099	.911	.599				
	15.125	5.187	5.062	4.812	4.687	4.562	4.250	4.062	3.750	3.562	3.500	3.250	3.062	2.750	2.562	2.187	1.687	1.562	1.062	.875					
	15.010	5.130	5.005	4.755	4.630	4.505	4.192	4.005	3.692	3.505	3.442	3.192	3.005	2.692	2.505	2.130	1.630	1.505	1.005	.817					
18⅝	17.855	6.552	6.427	6.177	6.052	5.927	5.615	5.427	5.115	4.927	4.865	4.615	4.427	4.115	3.927	3.552	3.052	2.927	2.427	2.240	1.927	.927			
	17.755	6.502	6.377	6.127	6.002	5.877	5.565	5.377	5.065	4.877	4.815	4.565	4.377	4.065	3.877	3.502	3.002	2.877	2.377	2.190	1.877	.877			
	17.655	6.452	6.327	6.077	5.952	5.827	5.515	5.327	5.015	4.827	4.765	4.515	4.327	4.015	3.827	3.452	2.952	2.827	2.327	2.140	1.827	.827			
20	19.190	7.220	7.095	6.845	6.720	6.595	6.282	6.095	5.782	5.595	5.532	5.282	5.095	4.782	4.595	4.220	3.720	3.595	3.095	2.907	2.595	1.595			
21½	20.710	7.980	7.855	7.605	7.480	7.355	7.042	6.855	6.542	6.355	6.292	6.042	5.855	5.542	5.355	4.980	4.480	4.355	3.855	3.667	3.355	2.355	1.042		
	20.610	7.930	7.805	7.555	7.430	7.305	6.992	6.805	6.492	6.305	6.242	5.992	5.805	5.492	5.305	4.930	4.430	4.305	3.805	3.617	3.305	2.305	.992		
	20.510	7.880	7.755	7.505	7.380	7.255	6.942	6.755	6.442	6.255	6.192	5.942	5.755	5.442	5.255	4.880	4.380	4.255	3.755	3.567	3.255	2.255	.942		
24½	23.750	9.500	9.375	9.125	9.000	8.875	8.562	8.375	8.062	7.875	7.812	7.562	7.375	7.062	6.875	6.500	6.000	5.875	5.375	5.187	4.875	3.875	2.562	1.875	1.125
	23.650	9.450	9.325	9.075	8.950	8.825	8.512	8.325	8.012	7.825	7.762	7.512	7.325	7.012	6.825	6.450	5.950	5.825	5.325	5.137	4.825	3.825	2.512	1.825	1.075

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YEARS of experience in making steel and wrought iron have taught us how to avoid the errors and inaccuracies of ordinary pipe-making. This experience is combined with rigid standards of inspection throughout the manufacturing process. The result is Chester High Tensile Casing—the casing you can trust to fill your pipe requirements, with maximum economy of operation.

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Bridgeport Machine Co., Wichita, Kansas, and Branches.

Louisiana Supply Co., Sulphur and Brimstone, La.

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CHESTER

STEEL CASING AND LINE PIPE

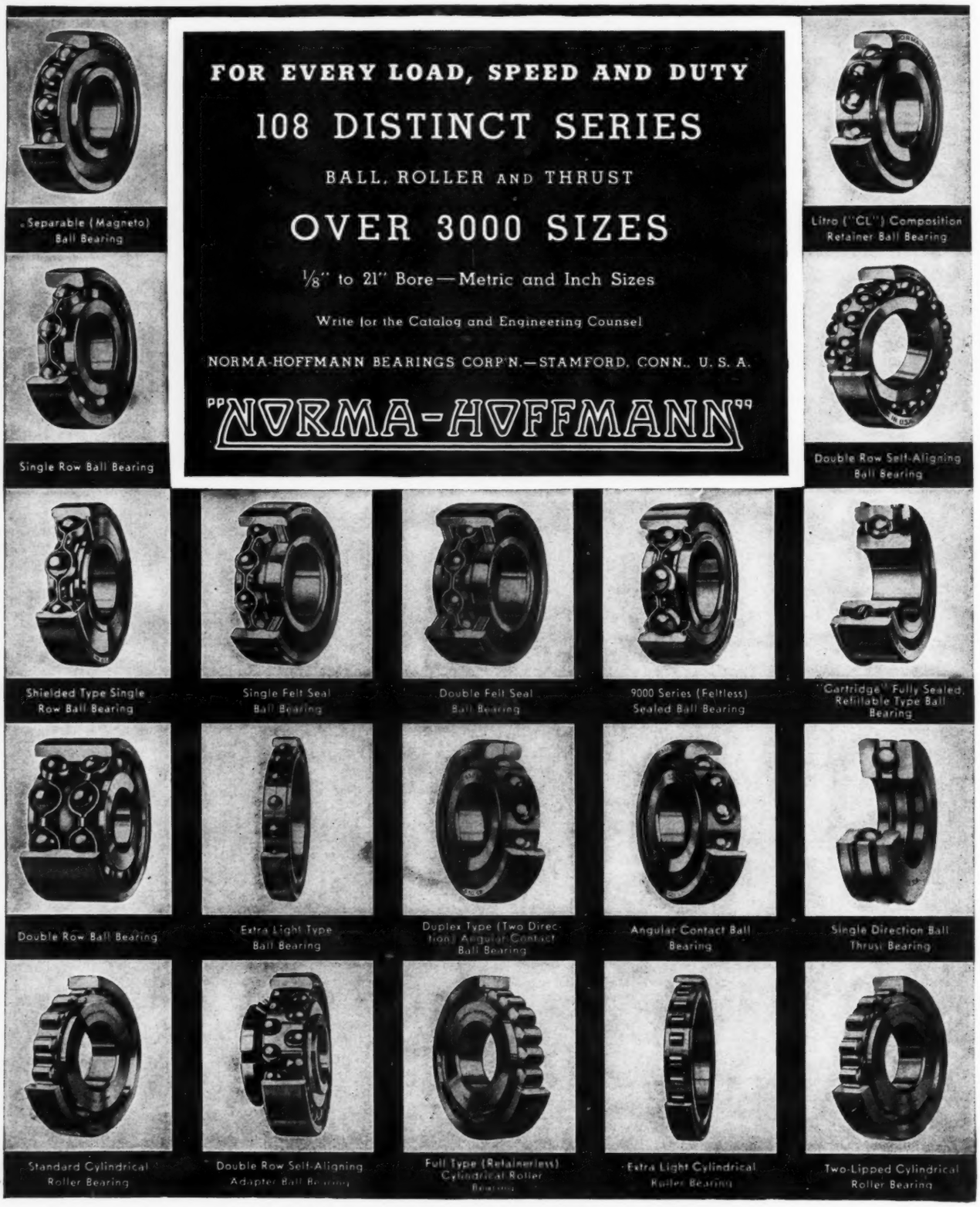
THEORETICAL CAPACITY OF RECIPROCATING PUMPS, GAL. PER MIN. PER CYLINDER

Displacement, gal. per stroke per cylinder[1]	Pumping speed, strokes[2] (revolutions) per min.										
	25	30	35	40	45	50	55	60	75	100	125
0.055	1.38	1.65	1.92	2.20	2.48	2.75	3.02	3.30	4.12	5.50	6.88
0.070	1.75	2.10	2.45	2.80	3.15	3.50	3.85	4.20	5.25	7.00	8.75
0.085	2.12	2.55	2.98	3.40	3.82	4.25	4.68	5.10	6.38	8.50	10.62
0.100	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	7.50	10.00	12.50
0.120	3.00	3.60	4.20	4.80	5.40	6.00	6.60	7.20	9.00	12.00	15.00
0.140	3.50	4.20	4.90	5.60	6.30	7.00	7.70	8.40	10.50	14.00	17.50
0.160	4.00	4.80	5.60	6.40	7.20	8.00	8.80	9.60	12.00	16.00	20.00
0.180	4.50	5.40	6.30	7.20	8.10	9.00	9.90	10.80	13.50	18.00	22.50
0.200	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	15.00	20.00	25.00
0.210	5.25	6.30	7.35	8.40	9.45	10.50	11.55	12.60	15.75	21.00	26.25
0.220	5.50	6.60	7.70	8.80	9.90	11.00	12.10	13.20	16.50	22.00	27.50
0.230	5.75	6.90	8.05	9.20	10.35	11.50	12.65	13.80	17.25	23.00	28.75
0.240	6.00	7.20	8.40	9.60	10.80	12.00	13.20	14.40	18.00	24.00	30.00
0.250	6.25	7.50	8.75	10.00	11.25	12.50	13.75	15.00	18.75	25.00	31.25
0.260	6.50	7.80	9.10	10.40	11.70	13.00	14.30	15.60	19.50	26.00	32.50
0.270	6.75	8.10	9.45	10.80	12.15	13.50	14.85	16.20	20.25	27.00	33.75
0.280	7.00	8.40	9.80	11.20	12.60	14.00	15.40	16.80	21.00	28.00	35.00
0.290	7.25	8.70	10.15	11.60	13.05	14.50	15.95	17.40	21.75	29.00	36.25
0.300	7.50	9.00	10.50	12.00	13.50	15.00	16.50	18.00	22.50	30.00	37.50
0.310	7.75	9.30	10.85	12.40	13.95	15.50	17.05	18.60	23.25	31.00	38.75
0.320	8.00	9.60	11.20	12.80	14.40	16.00	17.60	19.20	24.00	32.00	40.00
0.330	8.25	9.90	11.55	13.20	14.85	16.50	18.15	19.80	24.75	33.00	41.25
0.340	8.50	10.20	11.90	13.60	15.30	17.00	18.70	20.40	25.50	34.00	42.50
0.350	8.75	10.50	12.25	14.00	15.75	17.50	19.25	21.00	26.25	35.00	43.75
0.360	9.00	10.80	12.60	14.40	16.20	18.00	19.80	21.60	27.00	36.00	45.00
0.370	9.25	11.10	12.95	14.80	16.65	18.50	20.35	22.20	27.75	37.00	46.25
0.380	9.50	11.40	13.30	15.20	17.10	19.00	20.90	22.80	28.50	38.00	47.50
0.390	9.75	11.70	13.65	15.60	17.55	19.50	21.45	23.40	29.25	39.00	48.75
0.400	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	30.00	40.00	50.00
0.410	10.25	12.30	14.35	16.40	18.45	20.50	22.55	24.60	30.75	41.00	51.25
0.420	10.50	12.60	14.70	16.80	18.90	21.00	23.10	25.20	31.50	42.00	52.50
0.430	10.75	12.90	15.05	17.20	19.35	21.50	23.65	25.80	32.25	43.00	53.75
0.440	11.00	13.20	15.40	17.60	19.80	22.00	24.20	26.40	33.00	44.00	55.00
0.450	11.25	13.50	15.75	18.00	20.25	22.50	24.75	27.00	33.75	45.00	56.25
0.460	11.50	13.80	16.10	18.40	20.70	23.00	25.30	27.60	34.50	46.00	57.50
0.470	11.75	14.10	16.45	18.80	21.15	23.50	25.85	28.20	35.25	47.00	58.75
0.480	12.00	14.40	16.80	19.20	21.60	24.00	26.40	28.80	36.00	48.00	60.00
0.490	12.25	14.70	17.15	19.60	22.05	24.50	26.95	29.40	36.75	49.00	61.25
0.500	12.50	15.00	17.50	20.00	22.50	25.00	27.50	30.00	37.50	50.00	62.50
0.510	12.75	15.30	17.85	20.40	22.95	25.50	28.05	30.60	38.25	51.00	63.75
0.520	13.00	15.60	18.20	20.80	23.40	26.00	28.60	31.20	39.00	52.00	65.00
0.530	13.25	15.90	18.55	21.20	23.85	26.50	29.15	31.80	39.75	53.00	66.25
0.540	13.50	16.20	18.90	21.60	24.30	27.00	29.70	32.40	40.50	54.00	67.50
0.550	13.75	16.50	19.25	22.00	24.75	27.50	30.25	33.00	41.25	55.00	68.75

[1]Table P 094.865, Sheets 1 and 2, pp. 123, 125, July, 1937.

[2]For double-acting pumps make sure that the "displacement" value used is the total for both ends of the pump.

PRECISION BEARINGS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1/8" to 21" Bore—Metric and Inch Sizes
Write for the Catalog and Engineering Counsel
NORMA-HOFFMANN BEARINGS CORP'N.—STAMFORD, CONN., U. S. A.
"NORMA-HOFFMANN"
Separable (Magneto) Ball Bearing
Litro ("CL") Composition Retainer Ball Bearing
Single Row Ball Bearing
Double Row Self-Aligning Ball Bearing
Shielded Type Single Row Ball Bearing
Single Felt Seal Ball Bearing
Double Felt Seal Ball Bearing
9000 Series (Feltless) Sealed Ball Bearing
"Cartridge" Fully Sealed, Refillable Type Ball Bearing
Double Row Ball Bearing
Extra Light Type Ball Bearing
Duplex Type (Two Direction) Angular Contact Ball Bearing
Angular Contact Ball Bearing
Single Direction Ball Thrust Bearing
Standard Cylindrical Roller Bearing
Double Row Self-Aligning Adapter Ball Bearing
Full Type (Retainerless) Cylindrical Roller Bearing
Extra Light Cylindrical Roller Bearing
Two-Lipped Cylindrical Roller Bearing

BOOTH NO. 8 — INTERNATIONAL PETROLEUM EXPOSITION

PRESSURE DROP, LB. PER SQ. IN. PER MILE OF 6-IN. PIPE LINE (OIL OF 30° A.P.I.)

Quantity of 30° A.P.I. oil, bbl. per hr.	Viscosity of oil, Saybolt Universal seconds										
	100	110	120	130	140	150	160	180	200	220	240
200	7.20	7.42	7.62	7.79	7.96	8.12	8.27	8.57	8.83	9.07	9.29
205	7.53	7.74	7.95	8.14	8.31	8.48	8.63	8.94	9.22	9.47	9.70
210	7.84	8.06	8.28	8.48	8.66	8.83	8.99	9.30	9.59	9.86	10.10
215	8.17	8.40	8.62	8.83	9.02	9.20	9.37	9.69	10.00	10.27	10.52
220	8.51	8.75	8.97	9.19	9.39	9.58	9.76	10.09	10.40	10.69	10.95
225	8.85	9.10	9.32	9.56	9.76	9.96	10.15	10.48	10.82	11.12	11.39
230	9.19	9.45	9.69	9.93	10.15	10.34	10.54	10.89	11.23	11.55	11.83
235	9.54	9.81	10.07	10.31	10.54	10.74	10.94	11.31	11.65	11.98	12.28
240	9.90	10.19	10.45	10.69	10.93	11.15	11.35	11.73	12.09	12.43	12.73
245	10.27	10.56	10.84	11.08	11.33	11.55	11.77	12.16	12.53	12.89	13.20
250	10.62	10.93	11.22	11.46	11.72	11.95	12.18	12.59	12.96	13.33	13.65
255	11.00	11.32	11.62	11.87	12.13	12.37	12.60	13.03	13.41	13.79	14.13
260	11.38	11.71	12.02	12.28	12.55	12.79	13.03	13.48	13.87	14.26	14.61
265	11.77	12.10	12.43	12.70	12.97	13.23	13.47	13.93	14.34	14.73	15.11
270	12.15	12.51	12.83	13.12	13.40	13.67	13.92	14.39	14.81	15.21	15.61
275	12.54	12.92	13.26	13.55	13.83	14.11	14.37	14.86	15.30	15.70	16.12
280	12.94	13.33	13.68	13.99	14.28	14.56	14.83	15.33	15.78	16.20	16.62
285	13.35	13.75	14.10	14.44	14.73	15.02	15.30	15.82	16.28	16.70	17.13
290	13.75	14.16	14.53	14.88	15.18	15.46	15.75	16.29	16.76	17.19	17.64
295	14.16	14.59	14.97	15.32	15.64	15.92	16.22	16.78	17.27	17.71	18.16
300	14.58	15.01	15.41	15.77	16.11	16.40	16.71	17.27	17.78	18.24	18.69
305	15.01	15.45	15.86	16.24	16.58	16.89	17.21	17.77	18.30	18.79	19.24
310	15.43	15.89	16.33	16.70	17.06	17.38	17.69	18.29	18.83	19.32	19.79
315	15.88	16.33	16.79	17.18	17.55	17.87	18.20	18.80	19.36	19.86	20.35
320	16.32	16.78	17.25	17.65	18.03	18.37	18.70	19.33	19.91	20.42	20.91
325	16.76	17.24	17.71	18.12	18.51	18.87	19.20	19.84	20.43	20.98	21.48
330	17.20	17.71	18.19	18.61	19.02	19.37	19.71	20.38	20.98	21.53	22.06
335	17.67	18.18	18.67	19.10	19.52	19.90	20.24	20.92	21.54	22.11	22.64
340	18.13	18.66	19.14	19.61	20.02	20.42	20.78	21.46	22.10	22.69	23.22
345	18.60	19.15	19.64	20.12	20.53	20.95	21.32	22.02	22.67	23.27	23.82
350	19.07	19.63	20.15	20.64	21.06	21.49	21.86	22.57	23.24	23.86	24.43
355	19.56	20.13	20.65	21.14	21.59	22.02	22.42	23.13	23.82	24.46	25.04
360	20.04	20.62	21.16	21.66	22.13	22.57	22.97	23.71	24.40	25.06	25.66
365	20.51	21.11	21.66	22.18	22.65	23.09	23.53	24.26	24.97	25.65	26.28
370	21.00	21.61	22.18	22.69	23.20	23.64	24.09	24.85	25.58	26.27	26.90
375	21.49	22.11	22.70	23.22	23.75	24.21	24.67	25.44	26.19	26.89	27.53
380	21.98	22.62	23.23	23.76	24.30	24.77	25.25	26.04	26.81	27.52	28.19
385	22.48	23.16	23.76	24.31	24.86	25.37	25.83	26.65	27.42	28.15	28.83
390	23.00	23.68	24.29	24.88	25.42	25.94	26.42	27.25	28.05	28.79	29.49
395	23.52	24.22	24.82	25.43	25.99	26.52	27.01	27.87	28.68	29.45	30.14
400	24.04	24.73	25.37	25.99	26.54	27.09	27.59	28.49	29.30	30.06	30.80
405	24.57	25.28	25.94	26.55	27.11	27.67	28.18	29.11	29.94	30.72	31.48
410	25.11	25.84	26.51	27.14	27.69	28.29	28.79	29.76	30.59	31.39	32.16
415	25.65	26.39	27.09	27.70	28.26	28.88	29.42	30.39	31.24	32.06	32.85
420	26.20	26.93	27.64	28.30	28.87	29.50	30.03	31.03	31.89	32.73	33.55
425	26.72	27.50	28.22	28.89	29.49	30.10	30.67	31.66	32.55	33.41	34.22
430	27.27	28.07	28.81	29.50	30.11	30.71	31.29	32.33	33.24	34.10	34.92
435	27.83	28.64	29.40	30.08	30.73	31.35	31.94	32.98	33.91	34.78	35.63
440	28.37	29.20	29.98	30.67	31.33	31.94	32.54	33.64	34.59	35.45	36.32
445	28.93	29.79	30.55	31.29	31.97	32.56	33.20	34.29	35.29	36.18	37.03
450	29.50	30.37	31.15	31.91	32.60	33.20	33.86	34.95	36.00	36.91	37.78
455	30.06	30.96	31.76	32.53	33.24	33.85	34.50	35.64	36.69	37.64	38.50
460	30.64	31.55	32.37	33.16	33.88	34.51	35.17	36.34	37.41	38.35	39.23
465	31.21	32.18	32.98	33.79	34.53	35.17	35.81	37.04	38.13	39.10	40.00
470	31.79	32.78	33.60	34.42	35.18	35.84	36.49	37.74	38.86	39.81	40.77
475	32.37	33.38	34.22	35.06	35.83	36.50	37.17	38.45	39.56	40.57	41.51
480	32.94	33.97	34.82	35.68	36.47	37.15	37.84	39.14	40.27	41.30	42.23
485	33.56	34.61	35.49	36.33	37.13	37.83	38.53	39.86	41.02	42.07	43.01
490	34.15	35.22	36.15	36.97	37.80	38.55	39.22	40.58	41.72	42.83	43.80
495	34.75	35.84	36.79	37.66	38.46	39.23	39.92	41.31	42.48	43.61	44.59
500	35.34	36.50	37.46	38.32	39.14	39.92	40.63	42.04	43.23	44.38	45.39

Effectiveness . . .

WHEREVER you are, whatever your oxygen requirements, large or small, steady or irregular, Linde's production and distribution facilities are available to supply your demand promptly—effectively.

Whatever your application problems involving the oxy-acetylene process, whether in production, repair, or new construction, Linde's service and engineering facilities, if you are a Linde user, can assist you.

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See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY. 14-21

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THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
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New York and Principal Cities
In Canada: Dominion Oxygen Company, Limited, Toronto

Everything for Oxy-Acetylene Welding and Cutting

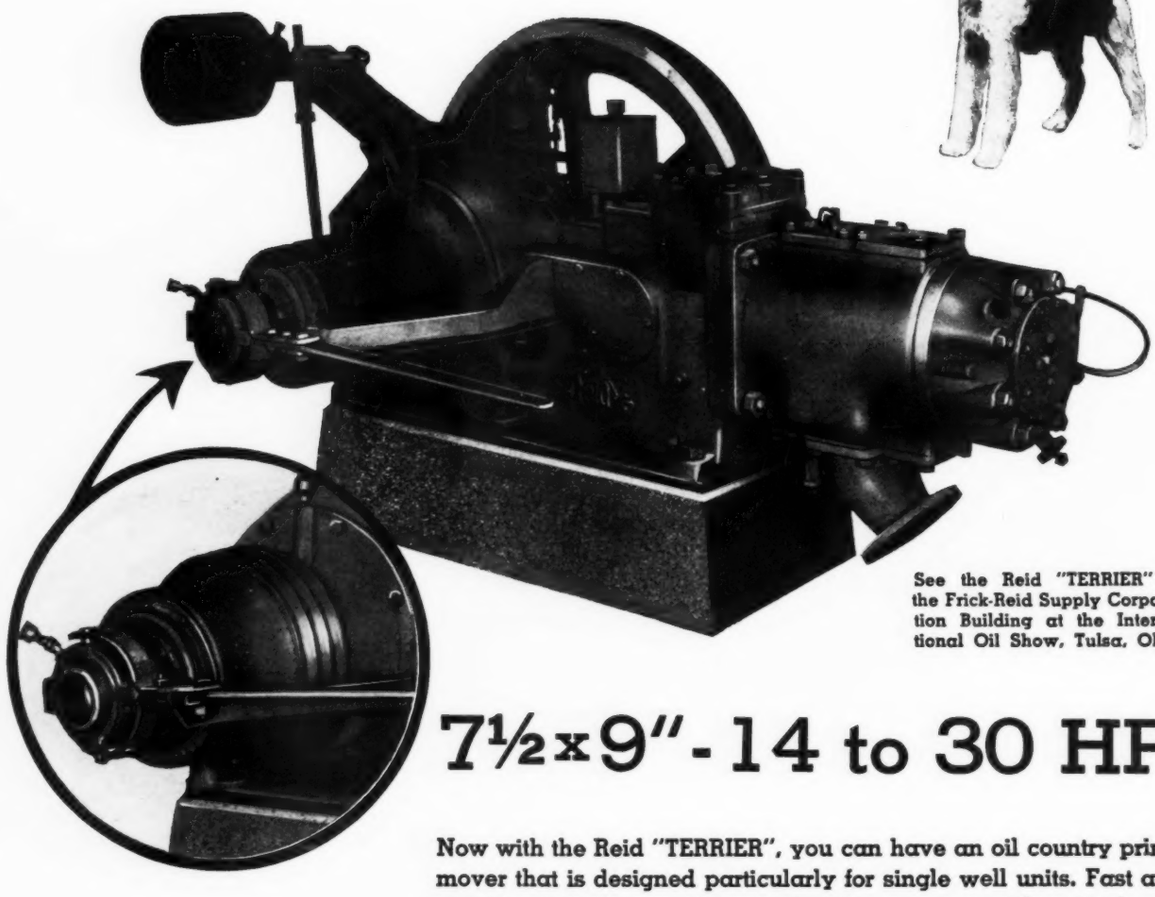
LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES FROM UCC LINDE UNION CARBIDE

VELOCITY[1] OF FLOW, FT. PER SEC., THROUGH 2-IN. TUBING

Rate of production, bbl. per day	Gas-oil ratio, cu. ft. per bbl.	Tubing pressure at casinghead, lb. per sq. in. gauge								
		0	25	50	75	100	125	150	175	200
50	1000	26.8	10.0	6.2	4.5	3.6	3.0	2.5	2.2	2.0
100		53.6	20.0	12.4	9.0	7.1	5.9	5.1	4.4	3.9
150		80.4	30.1	18.6	13.6	10.7	8.9	7.6	6.6	5.9
200		107.2	40.1	24.8	18.1	14.3	11.8	10.1	8.9	7.9
250		134.0	50.1	31.0	22.6	17.8	14.8	12.6	11.1	9.9
300		160.8	60.1	37.2	27.1	21.4	17.7	15.2	13.3	11.8
350		187.7	70.1	43.4	31.6	25.0	20.7	17.7	15.5	13.8
400		214.5	80.2	49.6	36.1	28.5	23.6	20.2	17.7	15.8
50	1250	33.5	12.5	7.7	5.6	4.4	3.7	3.1	2.7	2.4
100		66.9	25.0	15.4	11.2	8.8	7.3	6.2	5.5	4.9
150		100.4	37.5	23.2	16.8	13.3	11.0	9.4	8.2	7.3
200		133.9	49.9	30.9	22.4	17.7	14.6	12.5	10.9	9.7
250		167.3	62.4	38.6	28.1	22.1	18.3	15.6	13.7	12.2
300		200.8	74.9	46.3	33.7	26.5	21.9	18.7	16.4	14.6
350		234.3	87.4	54.0	39.3	30.9	25.6	21.9	19.1	17.0
400		267.8	99.9	61.8	44.9	35.4	29.2	25.0	21.9	19.4
50	1500	40.1	15.0	9.2	6.7	5.3	4.4	3.7	3.2	2.9
100		80.3	29.9	18.5	13.4	10.5	8.7	7.4	6.5	5.8
150		120.4	44.9	27.7	20.1	15.8	13.1	11.2	9.7	8.7
200		160.5	59.8	36.9	26.8	21.1	17.4	14.9	13.0	11.5
250		200.7	74.8	46.2	33.5	26.4	21.8	18.6	16.2	14.4
300		240.8	89.7	55.4	40.2	31.6	26.1	22.3	19.5	17.3
350		280.9	104.7	64.6	46.9	36.9	30.5	26.0	22.7	20.2
400		321.1	119.6	73.9	53.6	42.2	34.9	29.7	26.0	23.1
50	1750	46.8	17.4	10.7	7.8	6.1	5.1	4.3	3.8	3.3
100		93.6	34.8	21.5	15.6	12.3	10.1	8.6	7.5	6.7
150		140.4	52.3	32.2	23.4	18.4	15.2	12.9	11.3	10.0
200		187.2	69.7	43.0	31.2	24.5	20.2	17.3	15.1	13.4
250		234.0	87.1	53.7	39.0	30.6	25.3	21.6	18.8	16.7
300		280.8	104.5	64.5	46.8	36.8	30.3	25.9	22.6	20.1
350		327.6	122.0	75.2	54.6	42.9	35.4	30.2	26.4	23.4
400		374.4	139.4	86.0	62.4	49.0	40.5	34.5	30.1	26.7
50	2000	53.5	19.9	12.3	8.9	7.0	5.8	4.9	4.3	3.8
100		106.9	39.8	24.5	17.8	14.0	11.5	9.8	8.6	7.6
150		160.4	59.7	36.8	26.7	20.9	17.3	14.7	12.8	11.4
200		213.8	79.6	49.0	35.5	27.9	23.0	19.6	17.1	15.2
250		267.3	99.4	61.3	44.4	34.9	28.8	24.5	21.4	19.0
300		320.8	119.3	73.6	53.3	41.9	34.6	29.4	25.7	22.8
350		374.2	139.2	85.8	62.2	48.9	40.3	34.4	30.0	26.6
400		427.7	159.1	98.1	71.1	55.9	46.1	39.3	34.2	30.4
50	2250	60.1	22.4	13.8	10.0	7.8	6.5	5.5	4.8	4.3
100		120.3	44.7	27.6	20.0	15.7	12.9	11.0	9.6	8.5
150		180.4	67.1	41.3	29.9	23.5	19.4	16.5	14.4	12.8
200		240.5	89.4	55.1	39.9	31.3	25.8	22.0	19.2	17.0
250		300.6	111.8	68.9	49.9	39.2	32.3	27.5	24.0	21.3
300		360.8	134.1	82.7	59.9	47.0	38.8	33.0	28.8	25.5
350		420.9	156.5	96.4	69.8	54.9	45.2	38.5	33.6	29.8
400		481.0	178.9	110.2	79.8	62.7	51.7	44.0	38.4	34.0
50	2500	66.8	24.8	15.3	11.1	8.7	7.2	6.1	5.3	4.7
100		133.6	49.6	30.6	22.1	17.4	14.3	12.2	10.6	9.4
150		200.4	74.5	45.9	33.2	26.1	21.5	18.3	15.9	14.1
200		267.2	99.3	61.2	44.3	34.8	28.6	24.4	21.3	18.8
250		333.9	124.1	76.5	55.4	43.5	35.8	30.5	26.6	23.6
300		400.7	148.9	91.7	66.4	52.1	43.0	36.6	31.9	28.3
350		467.5	173.8	107.0	77.5	60.8	50.1	42.7	37.2	33.0
400		534.3	198.6	122.3	88.6	69.5	57.3	48.8	42.5	37.7

[1]Solution and condensation under pressure are not considered; hence the values are maxima.

REID TERRIER



See the Reid "TERRIER" in the Frick-Reid Supply Corporation Building at the International Oil Show, Tulsa, Okla.

7½x9"-14 to 30 HP.

Shown above is the Reid "TERRIER" 7½ x 9" Gas Engine Flat Belt Reid Patented Take-Off. The insert shows the Take-Off with V-Belt Sheave.

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Now with the Reid "TERRIER", you can have an oil country prime mover that is designed particularly for single well units. Fast and snappy operation, quick acceleration over a wide speed and power range, and inherent ruggedness and stamina, enables the "TERRIER" to do the job as it should be done—without fuss or trouble. It is built to stand oilfield use, simple in design, easy to operate, compact and easy to move around, economical to install, service, and maintain.

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OIL CITY, PENNSYLVANIA

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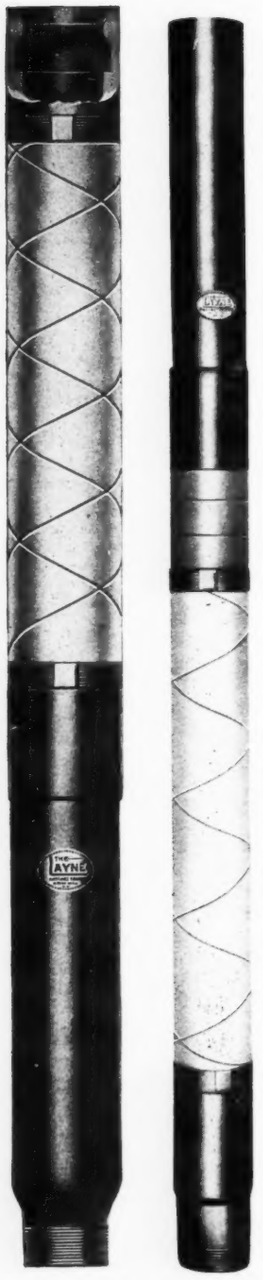
VELOCITY[1] OF FLOW, FT. PER SEC., THROUGH 3-IN. TUBING

Rate of production, bbl. per day	Gas-oil ratio, cu. ft. per bbl.	Tubing pressure at casinghead, lb. per sq. in. gauge								
		0	25	50	75	100	125	150	175	200
50	1000	11.9	4.5	2.8	2.0	1.6	1.3	1.1	1.0	0.9
100		23.8	8.9	5.5	4.0	3.2	2.6	2.2	2.0	1.8
150		35.8	13.4	8.3	6.0	4.8	3.9	3.4	3.0	2.6
200		47.7	17.8	11.0	8.0	6.3	5.3	4.5	3.9	3.5
250		59.6	22.3	13.8	10.0	7.9	6.6	5.6	4.9	4.4
300		71.5	26.7	16.6	12.1	9.5	7.9	6.7	5.9	5.3
350		83.4	31.2	19.3	14.1	11.1	9.2	7.9	6.9	6.1
400		95.3	35.6	22.1	16.1	12.7	10.5	9.0	7.9	7.0
50	1250	14.9	5.6	3.4	2.5	2.0	1.6	1.4	1.2	1.1
100		29.8	11.1	6.9	5.0	3.9	3.3	2.8	2.4	2.2
150		44.6	16.7	10.3	7.5	5.9	4.9	4.2	3.6	3.2
200		59.5	22.2	13.7	10.0	7.9	6.5	5.6	4.9	4.3
250		74.4	27.8	17.2	12.5	9.8	8.1	6.9	6.1	5.4
300		89.3	33.3	20.6	15.0	11.8	9.8	8.3	7.3	6.5
350		104.2	38.9	24.0	17.5	13.8	11.4	9.7	8.5	7.6
400		119.1	44.4	27.5	20.0	15.7	13.0	11.1	9.7	8.6
50	1500	17.8	6.6	4.1	3.0	2.3	1.9	1.7	1.4	1.3
100		35.7	13.3	8.2	6.0	4.7	3.9	3.3	2.9	2.6
150		53.5	19.9	12.3	8.9	7.0	5.8	5.0	4.3	3.9
200		71.4	26.6	16.4	11.9	9.4	7.7	6.6	5.8	5.1
250		89.2	33.2	20.5	14.9	11.7	9.7	8.3	7.2	6.4
300		107.1	39.9	24.6	17.9	14.1	11.6	9.9	8.7	7.7
350		124.9	46.5	28.7	20.9	16.4	13.6	11.6	10.1	9.0
400		142.8	53.2	32.8	23.8	18.8	15.5	13.2	11.6	10.3
50	1750	20.8	7.7	4.8	3.5	2.7	2.2	1.9	1.7	1.5
100		41.6	15.5	9.6	6.9	5.4	4.5	3.8	3.3	3.0
150		62.4	23.2	14.3	10.4	8.2	6.7	5.8	5.0	4.5
200		83.2	31.0	19.1	13.9	10.9	9.0	7.7	6.7	5.9
250		104.0	38.7	23.9	17.3	13.6	11.2	9.6	8.4	7.4
300		124.8	46.5	28.7	20.8	16.3	13.5	11.5	10.0	8.9
350		145.7	54.2	33.5	24.3	19.1	15.7	13.4	11.7	10.4
400		166.5	62.0	38.2	27.7	21.8	18.0	15.3	13.4	11.9
50	2000	23.8	8.8	5.5	4.0	3.1	2.6	2.2	1.9	1.7
100		47.5	17.7	10.9	7.9	6.2	5.1	4.4	3.8	3.4
150		71.3	26.5	16.4	11.9	9.3	7.7	6.5	5.7	5.1
200		95.1	35.4	21.8	15.8	12.4	10.2	8.7	7.6	6.8
250		118.9	44.2	27.3	19.8	15.5	12.8	10.9	9.5	8.4
300		142.6	53.1	32.7	23.7	18.6	15.4	13.1	11.4	10.1
350		166.4	61.9	38.2	27.7	21.7	17.9	15.3	13.3	11.8
400		190.2	70.7	43.6	31.6	24.8	20.5	17.5	15.2	13.5
50	2250	26.7	9.9	6.1	4.4	3.5	2.9	2.4	2.1	1.9
100		53.5	19.9	12.3	8.9	7.0	5.7	4.9	4.3	3.8
150		80.2	29.8	18.4	13.3	10.5	8.6	7.3	6.4	5.7
200		106.9	39.8	24.5	17.7	13.9	11.5	9.8	8.5	7.6
250		133.7	49.7	30.6	22.2	17.4	14.4	12.2	10.7	9.5
300		160.4	59.6	36.8	26.6	20.9	17.2	14.7	12.8	11.4
350		187.1	69.6	42.9	31.1	24.4	20.1	17.1	14.9	13.2
400		213.9	79.5	49.0	35.5	27.9	23.0	19.6	17.1	15.1
50	2500	29.7	11.0	6.8	4.9	3.9	3.2	2.7	2.4	2.1
100		59.4	22.1	13.6	9.8	7.7	6.4	5.4	4.7	4.2
150		89.1	33.1	20.4	14.8	11.6	9.6	8.1	7.1	6.3
200		118.8	44.2	27.2	19.7	15.5	12.7	10.8	9.5	8.4
250		148.5	55.2	34.0	24.6	19.3	15.9	13.6	11.8	10.5
300		178.2	66.2	40.8	29.5	23.2	19.1	16.3	14.2	12.6
350		207.9	77.3	47.6	34.5	27.0	22.3	19.0	16.5	14.7
400		237.6	88.3	54.4	39.4	30.9	25.5	21.7	18.9	16.8

[1]Solution and condensation under pressure are not considered; hence the values are maxima.

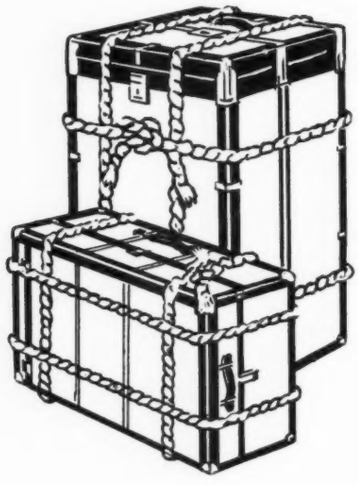
THEY *Won't* UNPACK !

THE LAYNE PACKERS



Tubing-Set Packer

Double Seal Packer



When you set the Layne Improved Ratchet Packer, you have a pack that is there to stay.

Forty-two inches of the best grade, closely woven canvas is wrapped spirally, right and left hand, over stem and lead. When the weight of the setting string is set down this canvas is forced outward and downward simultaneously.

The result is a pack approximately 20 inches long of almost iron hardness.

This extra long contact on the casing eliminates the necessity of fingers or slips to prevent packer from creeping up when exposed to high gas pressure.

The Layne Screw-Thru Ratchet Packer is made in 3 types: **All Canvas; Lead Cone and Canvas; Double Seal.**

LAYNE & BOWLER COMPANY

HOUSTON, TEXAS

EXPORT OFFICE:
Room 1836, 30 Rockefeller Plaza, New York, New York

SPECIFIC GRAVITY OF SULPHURIC ACID SOLUTIONS AT VARIOUS TEMPERATURES

Weight percent of H_2SO_4	Temperature of solution										
	0° C 32° F	10° C 50° F	15° C 59° F	20° C 68° F	25° C 77° F	30° C 86° F	40° C 104° F	50° C 122° F	60° C 140° F	80° C 176° F	100 °C 212° F
1	1.0074	1.0068	1.0060	1.0051	1.0038	1.0022	0.9986	0.9944	0.9895	0.9779	0.9645
2	1.0147	1.0138	1.0129	1.0118	1.0104	1.0087	1.0050	1.0006	0.9956	0.9839	0.9705
3	1.0219	1.0206	1.0197	1.0184	1.0169	1.0152	1.0113	1.0067	1.0017	0.9900	0.9766
4	1.0291	1.0275	1.0264	1.0250	1.0234	1.0216	1.0176	1.0129	1.0078	0.9961	0.9827
5	1.0364	1.0344	1.0332	1.0317	1.0300	1.0281	1.0240	1.0192	1.0140	1.0022	0.9888
6	1.0437	1.0414	1.0400	1.0385	1.0367	1.0347	1.0305	1.0256	1.0203	1.0084	0.9950
7	1.0511	1.0485	1.0469	1.0453	1.0434	1.0414	1.0371	1.0321	1.0266	1.0146	1.0013
8	1.0585	1.0556	1.0539	1.0522	1.0502	1.0481	1.0437	1.0386	1.0330	1.0209	1.0076
9	1.0660	1.0628	1.0610	1.0591	1.0571	1.0549	1.0503	1.0451	1.0395	1.0273	1.0140
10	1.0735	1.0700	1.0681	1.0661	1.0640	1.0617	1.0570	1.0517	1.0460	1.0338	1.0204
11	1.0810	1.0773	1.0753	1.0731	1.0710	1 0686	1.0637	1.0584	1.0526	1.0403	1.0269
12	1.0886	1.0846	1.0825	1.0802	1.0780	1.0756	1.0705	1.0651	1.0593	1.0469	1.0335
13	1.0962	1.0920	1.0898	1.0874	1.0851	1.0826	1.0774	1.0719	1.0661	1.0536	1.0402
14	1.1039	1.0994	1.0971	1.0947	1.0922	1.0897	1.0844	1.0788	1.0729	1.0603	1.0469
15	1.1116	1.1069	1.1045	1.1020	1.0994	1.0968	1.0914	1.0857	1.0798	1.0671	1.0537
16	1.1194	1.1145	1.1120	1.1094	1.1067	1.1040	1.0985	1.0927	1.0868	1.0740	1.0605
17	1.1272	1.1221	1.1195	1.1168	1.1141	1.1113	1.1057	1.0998	1.0938	1.0809	1.0674
18	1.1351	1.1298	1.1271	1.1243	1.1215	1.1187	1.1129	1.1070	1.1009	1.0879	1.0744
19	1.1430	1.1375	1.1347	1.1318	1.1290	1.1261	1.1202	1.1142	1.1081	1.0950	1.0814
20	1.1510	1.1453	1.1424	1.1394	1.1365	1.1335	1.1275	1.1215	1.1153	1.1021	1.0885
21	1.1590	1.1531	1.1501	1.1471	1.1441	1.1410	1.1349	1.1288	1.1226	1.1093	1.0957
22	1.1670	1.1609	1.1579	1.1548	1.1517	1.1486	1.1424	1.1362	1.1299	1.1166	1.1029
23	1.1751	1.1688	1.1657	1.1626	1.1594	1.1563	1.1500	1.1437	1.1373	1.1239	1.1102
24	1.1832	1.1768	1.1736	1.1704	1.1672	1.1640	1.1576	1.1512	1.1448	1.1313	1.1176
25	1.1914	1.1848	1.1816	1.1783	1.1750	1.1718	1.1653	1.1588	1.1523	1.1388	1.1250
26	1.1996	1.1929	1.1896	1.1862	1.1829	1.1796	1.1730	1.1665	1.1599	1.1463	1.1325
27	1.2078	1.2010	1.1976	1.1942	1.1909	1.1875	1.1808	1.1742	1.1676	1.1539	1.1400
28	1.2160	1.2091	1.2057	1.2023	1.1989	1.1955	1.1887	1.1820	1.1753	1.1616	1.1476
29	1.2243	1.2173	1.2138	1.2104	1.2069	1.2035	1.1966	1.1898	1.1831	1.1693	1.1553
30	1.2326	1.2255	1.2220	1.2185	1.2150	1.2115	1.2046	1.1977	1.1909	1.1771	1.1630
31	1.2409	1.2338	1.2302	1.2267	1.2232	1.2196	1.2126	1.2057	1.1988	1.1849	1.1708
32	1.2493	1.2421	1.2385	1.2349	1.2314	1.2278	1.2207	1.2137	1.2068	1.1928	1.1787
33	1.2577	1.2504	1.2468	1.2432	1.2396	1.2360	1.2289	1.2218	1.2148	1.2008	1.1866
34	1.2661	1.2588	1.2552	1.2515	1.2479	1.2443	1.2371	1.2300	1.2229	1.2088	1.1946
35	1.2746	1.2672	1.2636	1.2599	1.2563	1.2526	1.2454	1.2383	1.2311	1.2169	1.2027
36	1.2831	1.2757	1.2720	1.2684	1.2647	1.2610	1.2538	1.2466	1.2394	1.2251	1.2109
37	1.2917	1.2843	1.2805	1.2769	1.2732	1.2695	1.2622	1.2550	1.2477	1.2334	1.2192
38	1.3004	1.2929	1.2891	1.2855	1.2818	1.2780	1.2707	1.2635	1.2561	1.2418	1.2276
39	1.3091	1.3016	1.2978	1.2941	1.2904	1.2866	1.2793	1.2720	1.2646	1.2503	1.2361
40	1.3179	1.3103	1.3065	1.3028	1.2991	1.2953	1.2880	1.2806	1.2732	1.2589	1.2446
41	1.3268	1.3191	1.3153	1.3116	1.3079	1.3041	1.2967	1.2893	1.2819	1.2675	1.2532
42	1.3357	1.3280	1.3242	1.3205	1.3167	1.3129	1.3055	1.2981	1.2907	1.2762	1.2619
43	1.3447	1.3370	1.3332	1.3294	1.3256	1.3218	1.3144	1.3070	1.2996	1.2850	1.2707
44	1.3538	1.3461	1.3423	1.3384	1.3346	1.3308	1.3234	1.3160	1.3086	1.2939	1.2796
45	1.3630	1.3553	1.3515	1.3476	1.3437	1.3399	1.3325	1.3251	1.3177	1.3029	1.2886
46	1.3724	1.3646	1.3608	1.3569	1.3530	1.3492	1.3417	1.3343	1.3269	1.3120	1.2976
47	1.3819	1.3740	1.3702	1.3663	1.3624	1.3586	1.3510	1.3435	1.3362	1.3212	1.3067
48	1.3915	1.3835	1.3797	1.3758	1.3719	1.3680	1.3604	1.3528	1.3455	1.3305	1.3159
49	1.4012	1.3931	1.3893	1.3854	1.3814	1.3775	1.3699	1.3623	1.3549	1.3399	1.3253
50	1.4110	1.4029	1.3990	1.3951	1.3911	1.3872	1.3795	1.3719	1.3644	1.3494	1.3348

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